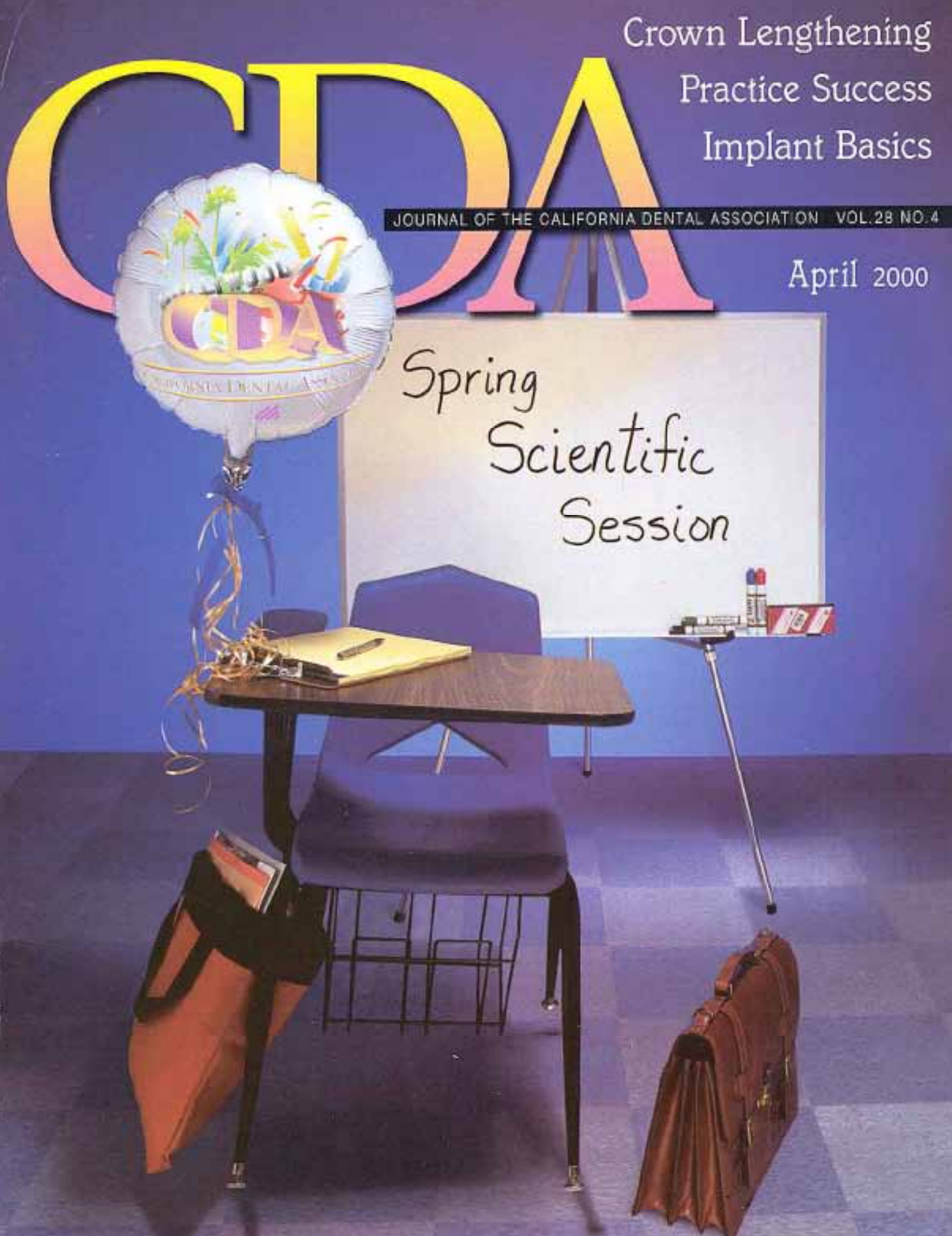
# CDA

Crown Lengthening
Practice Success
Implant Basics

JOURNAL OF THE CALIFORNIA DENTAL ASSOCIATION VOL.28 NO.4

April 2000



OF THE CALIFORNIA DENTAL ASSOCIATION
Journal
CDA Journal
Volume 28, Number 4
APRIL 2000

## DEPARTMENTS



## FEATURES

CDA JOURNAL, VOL 28, Nº4

# The Dentist's Dirty Secret

Jack F. Conley, DDS

Thus began the latest TV newsmagazine expose aimed more at alarming the public than educating them to the true status of a problem that dentistry has been dealing with for some time now. In mid-February, the ABC News "20/20" story titled "The Dentist's Dirty Secret" rewrote the how-to manual on pulling out all of the emotion-filled stops to grab the attention of the viewer. Only time will tell how effective their effort was in damaging the image of the dental profession. Lack of media attention immediately after the broadcast suggests that it may have failed to grab the public emotion it was seeking.

Make no mistake, dentistry does have a problem that requires closure, whether that be in the form of better dental unit waterline design or more practical procedures to ensure compliance with the 200 cfu/ml water standard that was set as a goal by the American Dental Association in 1995. However, network television continues to take great liberties in creating a sensational story.

For example, veteran TV news journalist Barbara Walters initiated the piece in a tone laced with disgust, "We did comparison tests, dental water vs. toilet water. What we found is enough to make you sick!" A researcher is shown going into a men's restroom and scooping water from a toilet and a urinal. Fortunately, it appeared that both vessels were clean and had been flushed. Other emotion-filled narrative included a description of water from the syringe in the dental office as being "so slimy, so dirty, it's been compared to pond scum." And finally, "Most dentists are still squirting bacteria-filled water into their patients' mouths."

Our concern is the emotion-grabbing manner in which it was presented. As might be expected, similar to past media presentations on dental issues, the tone was decidedly anti-dentistry. The emphasis was on "most" dentists doing nothing to prevent the problem with little discussion devoted to procedures or devices that would decrease the dangers of the biofilm. We wonder why positive information on steps that dentists are now taking to minimize the biofilm hazard cannot be shared with viewers in an educational manner? Could it be that positive information was lost at the editing console?

In an ADA News release prior to the airing of the 20/20 program, it was announced that noted microbiologist John Molinari, PhD, who is the ADA spokesperson on dental unit water, had been interviewed for 40 minutes in preparation for a story that was timed at approximately 12 1/2 minutes. Less than 1 1/2 minutes of the Molinari interview was aired, much of it focusing on findings that immunocompromised patients may be the only ones at risk for infection from the organisms found in the dental office waterlines. One can only suspect that the other 38 1/2 minutes of that interview discussed the important things that well-meaning dentists are doing to reduce the risk of biofilms, such as flushing of water lines, sterilization of syringe tips or use of disposable syringe tips, use of suck-back

CDA JOURNAL, VOL 28, Nº4

prevention devices, and sterilization of handpieces. Use of sterile water or saline in surgical procedures was addressed, but management of air-water syringes and handpieces in the general dental office was ignored, leaving the viewer with the distinct impression that in most general offices, "dentists are still squirting bacteria-filled water into their patients' mouths" without any effort to reduce or remove the risk.

Irrespective of the impact of this recent news spectacular on dentistry or its image, it is clear that dentistry does have a problem until research, development, and leadership place some clear choices in front of the profession for adoption. Until that happens, dentists are left to scramble individually to address ADA, Centers for Disease Control and Prevention, and Dental Board of California (formerly the Board of Dental Examiners) recommendations and infection control guidelines by purchasing costly sterile water systems or devices or by utilizing unproven filters or water cleansing products such as antimicrobials. Adding to the general practitioner's dilemma, the literature reveals scientific data such as that in the February 2000 issue of the Journal of the American Dental Association, "Dental Unit Waterline Antimicrobial Agents' Effect on Dentin Bond Strength," which concluded that "Dental unit waterline antimicrobial agents may adversely affect dentin bonding strength."

The major problem we see in this scenario is that progress toward a possible and practical universal solution has been incredibly slow, given its somewhat lengthy history. Now that "The Dentist's Dirty Secret" has been splashed across TV screens nationwide, it is hoped that the pace toward a complete solution of this problem will increase with deliberation.

CDA JOURNAL, VOL 28, Nº4

## Laser Shown to Prevent Caries

By David G. Jones

Even though the laser has been shown over the years to be useful in a variety of medical and dental applications, certain laser dental procedures have been unpredictable. But a recent pilot study shows that a laser is well suited for preparation of pits and fissures.

The study, presented at the Jan. 22-28 annual meeting of the International Society for Optical Engineering in San Jose, Calif., showed that occlusal pits and fissures can be conservatively prepared, cleaned, and etched, and can receive caries preventive effects all in one laser procedure.

"We killed three birds with one stone, rather than using multiple procedures with conventional techniques," says Douglas A. Young, DDS, associate professor at the University of the Pacific School of Dentistry. "Many may argue that this as an improvement over the dental drill."

The almost two-year-long study, titled "Treating Occlusal Pit and Fissure Surfaces by IR Laser Irradiation," was performed by Young; Daniel Fried, PhD; and John D.B. Featherstone, DDS, of the University of California at San Francisco School of Dentistry. The study involved irradiating occlusal pits and fissures of extracted human teeth with noncommercially available Er:YAG, Er:YSGG, and $CO_2$ lasers. A control group of teeth was treated with a dental bur. After treatment, artificial caries-like lesions were created that mimicked the biological process occurring in the mouth. The laser ablation groups resulted in a 50 percent inhibition of caries progression for both the $CO_2$ and Er:YAG, and 72 percent caries inhibition for the Er:YSGG laser when compared to the bur control group.

Young believes that the deep morphology of the pits and fissures combined with the currently available crude caries detection techniques make conventional treatment of the occlusal surfaces grossly inadequate.

"What makes this technology so exciting is that it is available to clinical dentists now to conservatively treat occlusal lesions even before they can be detected, and, based on this study, may also have the potential to prevent cares development."

Featherstone, an expert in the use of lasers in dentistry with almost 20 years of experience, says that this study is a significant step forward from previous laser research.

"One of the differences here is that it brought the caries prevention and caries removal research, previously on separate tracks, into one study," he says. "This was the first attempt to do a study that's closer to clinical reality."

Fried, who has worked closely with Featherstone for eight years on caries prevention with lasers, has also worked for the past five years on the caries removal research track. He says the question in his mind was when dentists drill through the enamel, is an acid-resistant layer being created as a side effect due to the heat buildup?

"We wanted to see if a laser could do it," says Fried, an associate professor in UCSF's Department of Restorative Dentistry. "Doug Young found he got caries inhibition with all three laser types, with no significant difference between them, but they did require markedly different radiation intensities."

The caries inhibition effect was achieved in the laboratory without the use of cooling water spray. Fried cautioned dentists using lasers to leave their water sprays turned on until further studies are done.

"We know from our study's results that without using a water spray during ablation with these systems, we actually created resistance to acid dissolution," Fried says. "That doesn't mean that people using lasers should turn off the cooling water, because that may create heat problems (such as) cooking the pulp."

Young said that a follow-up study would aim at more clearly defining the parameters for water spray use with lasers that will still achieve caries inhibition.

"If we can get the caries inhibition effect with the water spray, we won't need to turn it off," Young says. "But we have to attempt to show that this is possible with commercially available lasers."

Featherstone said the follow-up study would seek to find a compromise between energy delivery and water cooling impact to maintain a level of caries inhibition.

"My concept here is that we should use a laser with water spray to ablate the caries and a little of the enamel, then reduce the water spray to do the caries prevention," he says. "We're studying this concept in the progression of the idea toward clinical utilization."

Roger Rempfer, DMD, a laser expert and member of CDA's Council on Dental Care, says that some other laser procedures have been shown to be less than predictable, but in this area there is an effort at good science.

"In this particular area there is good reason to be optimistic that they will be able to modulate the heat and address incipient or pit and fissure caries," Rempfer says. "There's reason to be hopeful that they will at some juncture have this science dialed in so this will be a viable application."

Featherstone says that this use of lasers will be a future tool for caries intervention.

"This will be one of several tools used for intervention at an early stage, much

CDA JOURNAL, VOL 28, Nº4

better than having to do massive restorations at a later stage," he says. "Early caries identification, detection, and prevention will be a key part of this new paradigm as we move yet another step on the path from G.V. Black's research a century ago to the future."

## Putting Your Home in the Balance

By Marios P. Gregoriou

Measured by several factors, a home can be a good investment. But how good?

In a strong economy, a home's value can appreciate, and additional physical improvements will usually help increase the value.

Two other factors support consideration of a home as a solid investment. Specifically, traditional home ownership has a "forced savings" component that offers advantages. When a homeowner holds an amortizing mortgage, the monthly loan payments include principal pay-down as well as an interest payment. The principal portion of the loan increases with each loan payment made so that over several years homeowners can build up additional equity in the home.

Federal income tax also treats mortgage interest favorably: If a homeowner has taxable income, he or she may enjoy the effective return of between 15 percent and 39 percent of the mortgage interest payments.

Also attractive is the fact that home ownership involves predictable, steady monthly payments.

But how good an investment is a home compared to other liquid-asset class investments? As a measured investment, historical U.S. growth in property values has lagged behind long-term historical growth of stocks and bonds.

Also, steady payment of a mortgage may have certain drawbacks. Principal growth can be relatively low in the initial years of loan payback unless additional principal payments can be made without penalty. Compared with other investment options, equity growth can be relatively modest. And except for the deductibility of mortgage interest, the two other significant components -- forced savings and growth potential -- may deliver lower rates of return relative to other investment vehicles.

Those potential lower returns might be acceptable to people who consider a mortgage a debt to be completely repaid on or ahead of schedule. That thinking represents a traditional view of the role of a mortgage loan. But home ownership patterns have changed dramatically -- families move and refinance more frequently than ever. As a result, financial planners have developed alternative ways to view home ownership, evaluating the investment in the context of a homeowner's overall financial profile and long-term wealth creation goals.

The concept that all debt, including a home mortgage, should be evaluated and managed as part of an individual's overall financial plan is called Total Balance Sheet Management, through which people manage their liabilities with a goal of increasing their assets.

The key is that smart management of liabilities can ultimately reduce the cost of debt, preserve assets, and free liquidity to help long-term net worth growth. Homeowners can continue to pay down mortgage principal, invest, or use the additional liquidity elsewhere.

Lenders have produced hybrid mortgage loans with that benefit in mind. One popular product is an adjustable rate mortgage, with an initial fixed-rate period. During the initial five-, seven- or 10-year period, borrowers make interest-only payments, thus generating excess liquidity. The hybrid mortgage offers additional flexibility by allowing principal pay-down at any time, without penalty.

Even if the interest-only mortgage has a higher rate than the fully amortizing mortgage, the required monthly payments could be lower and the goal of generating additional liquidity for investment or other purposes can be achieved.

Upon conclusion of the initial period, the borrower has the option to refinance the mortgage, without prepayment penalty, into another hybrid adjustable-rate mortgage to once again leverage the liquidity derived from the fixed-rate interest-only period.

## Fees for Service

*Dental Economics* has released the results of its latest dental fee survey. Following is a list of sample fees drawn from the 1999 report. For the full results, see the December 1999 issue of Dental Economics.

**National Median of Select Dental Fees**

| Code | Procedure | Median Fee |
|---|---|---|
| 00150 | Comprehensive exam | $35.34 |
| 00210 | X-rays (complete) | 71.92 |
| 01110 | Adult prophylaxis | 49.63 |
| 02140 | One-surface amalgam | 63.25 |
| 03330 | Molar root canal | 550.33 |

CDA JOURNAL, VOL 28, Nº4

Incorporating one's home into a total financial picture can enhance the opportunity for long-term wealth accumulation.

Marios Gregoriou is an associate vice president and financial adviser with Morgan Stanley Dean Witter in Sacramento. He can be reached at (800) 755-8041.

## Navigating the Scientific Session

You've arrived in Anaheim for the Scientific Session. You've checked into your hotel, unpacked your bags, and made your way to the Convention Center. What do you do now?

- Grab a program – First, grab an on-site program. They are located throughout the registration area and have important information on classes and exhibitors.
- If you have a badge – If you have preregistered and received a badge (a small piece of paper with your name and the Session logo on it), go to the booth labeled "Badge-Holder Pickup." This will be a quick line. A nice staff member there will take your badge, tear off the perforated half (which CDA uses to count attendees), and hand you a badgeholder. Your badge must be in this holder for you to gain entrance to the Session.
- If you have a badge, but there is an error on it, you may have it corrected at the "Badge Correction" booth in the registration area.
- If you DO NOT have a badge – If you did not preregister or did not receive a badge in the mail, proceed to one of the kiosks with applications. Fill out the application and get in the line leading toward the booths labeled "On-Site Registration." There will be a fee for registering staff and guests at this time.

If you need to register for the Session and need renew your CDA membership, are a nonmember, or are from out of state or out of country, go to the "Special Registration" booth.

- To attend exhibits – To attend the exhibit, display your badge and enter the exhibit area. A badge is required for entrance.
- To attend classes – Continuing education lectures and symposia are free and are filled first-come, first-served. Go to the appropriate room. Your badge will be scanned on your way in. Take a seat and enjoy the class. Be sure to get the C.E. form that is handed out toward the end of class. It is still the primary source of receiving C.E. credits, because the scanning equipment is still in test mode. Fill out the form, keep the bottom part for your records, and drop it in one of the C.E. drop boxes located throughout the registration and classroom areas. If you are from out of state, you will need to mail the form in to CDA.
- To attend workshops – Tickets to fee workshops must be purchased in advanced. Go to the booth labeled "Ticketing Booth" in the registration area to sign up if you haven't already. If you have signed up, the room monitors will have your name on the class list.
- Enjoy the Session – Don't forget to get tickets for Disneyland and the Membership Celebration. They can be purchased at the Ticketing Booth in the registration area.

## Health Web Sites Aren't Private Clubs

Visitors to health Web sites are not anonymous, even if they think they are, and personal information shared with health Web sites is highly vulnerable, according to a report released by the California HealthCare Foundation.

The report conducted by Janlori Goldman and Zoe Hudson of the Health Privacy Project at Georgetown University, and Richard Smith, an Internet security expert, looked at the privacy policies and practices of 21 of the most heavily trafficked health sites on the Internet.

The privacy concerns related to those health Web sites don't stem from a concern about vulnerability to hackers, but from the fact that the sites are sharing the personal health information they collect from visitors with advertisers and others, without the visitors' knowledge or permission.

"We found that third-party ad networks receive access to information that would allow them to build detailed, personally identified profiles of individuals' health conditions and patterns of Internet use," Smith said.

### Among the report's findings:

- Health Web sites recognize consumers' concerns about the privacy of their personal health information and have made efforts to establish privacy policies; however, the policies fall short of truly safeguarding consumers.
- There is inconsistency between the privacy policies and the actual practices of health Web sites.
- Health Web sites with privacy policies that disclaim liability for the actions of third parties on the site negate those very policies.

The full report can be accessed at http://ehealth.chcf.org/priv_pol3/index_show.cfm?doc_id=33.

CDA JOURNAL, VOL 28, Nº4

## Antidepressants Can Cause Bruxism

The family of antidepressant medications that includes Prozac, Paxil, and Zoloft may cause bruxism and associated headaches, researchers report, adding that the antidepressant drug Buspar appears to provide relief.

Dr. John Michael Bostwick of the Mayo Clinic in Rochester, N.Y., and colleague Dr. Michael Jaffee published their findings in the December 1999 issue of the Journal of Clinical Psychiatry.

The researchers point out that the selective serotonin reuptake inhibitor family of medications can all suppress activity of the brain chemical dopamine. One of dopamine's important functions is the control of muscular or motor activity.

Bostwick and Jaffee described the case of a 61-year-old woman who reported severe nighttime bruxism soon after starting on Zoloft (setraline). The clenching cracked two of her crowns. In another case, a 35-year-old man reported constant jaw clenching and severe headaches connected with Zoloft use.

Symptoms were relieved in both cases after doctors added another type of antidepressant different from the selective serotonin reuptake inhibitors -- Buspar.

## Dental Spending is Projected to Rise

The government is expecting a 50 percent increase in dental spending by 2008, for an annual total of $93.1 billion, despite slower projected growth in private sector health spending.

The study by the Health Care Financing Administration Office of the Actuary appeared in the July/August 1999 issue of Health Affairs.

Americans spent an estimated $50.6 billion for dental care in 1997 and were expected to come close to $57 billion in 1999.

The dental economy will continue expanding at more than twice the rate of overall economic growth project by the Congressional Budget Office through 2009, an average of 2.4 percent per year.

In overall health, government actuaries expect spending to double from $1.1 trillion in 1997 to $2.2 trillion in 2008. From 2001-2008, private and public health spending will slow because the number of uninsured Americans is rising faster than expected.

## Web Watch: Southern California Attractions

The following are Web pages to help you plan family fun during your trip to Anaheim for CDA's Spring Scientific Session.

**http://www.anaheimoc.org/**
Site for the Anaheim/Orange County Visitor & Convention Bureau, which describes many of the attractions in the Anaheim area.

**http://disney.go.com/Disneyland/**
You can plan your trip to Disneyland on this page.

**http://www.knotts.com/**
This page has information on the Knott's Berry Farm theme park.

**http://www.angelsbaseball.com/**
Official Web site of the Anaheim Angels. The Angels will be playing at home in Edison Field through April 12.

**http://www.dodgers.com/index_dhtml.html**

Official site of the Los Angeles Dodgers. The Dodgers will be playing at home during the Scientific Session.

CDA JOURNAL, VOL 28, Nº4

# Implant Procedures 101

Curtis E. Jansen, DDS

**ABSTRACT** Many practitioners have found implant procedures to be too difficult or too much trouble to perform. Now that restorative components for most implant systems allow for cemented restorations, implant procedures for most clinical situations can be completed in two or three one-hour appointments. This article will review an easy-to-follow restorative philosophy using single- and two-to-three-unit implant restorative procedures that are similar to conventional dental procedures.

AUTHOR

**Curtis E. Jansen, DDS,** maintains a full-time private practice limited to prosthodontics in Monterey and Salinas, Calif.

Dental-implant surgical and restorative components and dental impression materials are the top two categories of items that dentists spend their money on. More than twice as much money is spent every year on implant-related products (an estimated $175 million) than on impression materials (an estimated $80 million). However, while most practitioners use impression materials frequently, most don't perform implant procedures. In fact, the average restorative dentist does not do implant procedures, and the average restorative dentist who does do implant procedures only performs them on two to three patients a year. Most practitioners have found implant procedures to be too difficult or too much trouble to perform. Now that restorative components for most implant systems allow for cemented restorations, implant procedures for most clinical situations can be completed in two or three one-hour appointments. This article will review an easy-to-follow restorative philosophy using single- and two-to-three-unit implant restorative procedures that are similar to conventional dental procedures.

In the past, most restorative dentists did not feel comfortable with implant procedures because of the variety designs available. Often, a restorative dentist would work with a surgeon who used a particular implant system; and, six months later, the same surgeon would be using a different system. Some surgeons change implant systems or implants within a system every 18 to 24 months because of


**Figure 1.** An orientation guide in place being attached to the adjacent teeth.

**Figure 2.** A model fabricated using the orientation guide can represent the position of the implant in relation to the hard and soft tissues.

**Figure 3.** Stage-two procedures being performed, exposing the implants.

**Figure 4.** The final restoration is placed at the time of stage-two surgery.

**Figure 5.** Custom abutment coping and provisional made prior to stage-two procedures.

**Figure 6.** Custom abutment being placed at the time of stage-two surgery

**Figure 7.** Copings in place after soft tissue maturity are ready for a tissue impression.

**Figure 8**. Final restorations in place.

perceived advances in design. Restorative doctors have found implant procedures difficult, the learning curve long, and office support staff unsure of how much time to allow for implant procedures or how many appointments to schedule to complete a treatment. The end result has often been an implant restoration with a lab bill that was more than expected, and frustration with the amount of time to needed complete treatment and with complications such as screw loosening. Today, with changes in restorative philosophy, implants restorations are being cemented and things are much different. Implants are getting easier to restore and more restorative practitioners will start working with them. Restoring dental implants can be very similar to doing conventional dentistry.

Posterior single-tooth restorations can be done in one restorative appointment after the implant has been placed. This is done by making a orientation guide (index) at the time the implant is placed (**Figure 1**). Different ways of indexing the implant at the time of surgery have been described.[2-4] Various components can be used to orient or index the implant at the time of surgery using impression copings, gold cylinders, or special indexing components, depending on the implant being used.

While an implant is being placed during the surgical appointment, the orientation or index can be made. Composite or resin can be placed on the orientation component and on several of the adjacent teeth. Once the material is set, the orientation guide is removed and set aside. The implant placement procedures are then completed. The implant is then allowed to integrate for the predetermined amount of time. The patient returns to the restorative dentist's office for impressions six to eight weeks after the surgery. This allows for any changes in the edentulous area to be recorded. An impression of the implant can be made at the time of implant surgery, but very little information is gained about the soft tissue in the surgical field.

A cast is made from the impression

of the patient after the implant has been placed. With this cast and the orientation guide made at the time of surgery, a model with an implant analog or replica can be fabricated. This model allows for laboratory procedures to be done while the implant is integrating (**Figure 2**). The laboratory fabricates a custom abutment (prepared tooth form) and a cementable restoration. A screw-through restoration could also be fabricated. For a posterior restoration -- where esthetics is not a concern -- the restoration is placed after the allowed time for integration. This final restoration may be placed (Figures 3 and 4) in the surgeon's office, thereby decreasing chairtime in the restorative dentist's office.

For anterior areas, or areas of esthetic concern in the posterior, the orientation guide (index) is made at the time of surgery (**Figure 1**) and sent to the lab. Again, six to eight weeks after the surgery, the patient returns for an impression of the edentulous area. This is done to record changes that may have occurred in the edentulous ridge due to surgery. The lab technician needs an accurate reproduction of the soft tissue architecture. The lab uses this model and the orientation guide to fabricate a model on which the custom abutment, final metal coping less veneer material, and provisional are fabricated (**Figure 5**). Due to potential tissue changes, a temporary -- rather than definitive -- restoration is made.

The custom abutment can be made from various materials. Prepable abutments are made from titanium, gold, or ceramic cast to cylinders made from plastic or gold, or from titanium and are computer generated (Procera, Nobel Biocare USA Inc., Yorba Linda, Calif.).

Once the implant is ready for stage-two procedures, or loading, the patient returns to the surgeon's office to have the custom abutment placed (**Figure 6**). The provisional is then placed on the custom abutment. This is an excellent time for the surgeon to determine if any soft tissue modification will be needed around the restoration or custom abutment. Again, the restoration is not completed because of the unpredictability of the soft tissue. The tissue is allowed to mature around the provisional for four to six weeks. The coping that was made is stored for the following appointment.

The patient leaves with a fixed restoration on the implant. No longer does the patient have a removable stayplate. In the past, one of the most difficult challenges for the restorative dentist was making a provisional for the single-tooth implant patient after surgery. The surgeon would normally place a healing abutment and have the patient continue to wear a stayplate. The stayplate would need to be modified to fit over the healing abutment, which was placed on the implant. This area of the stayplate, the acrylic tooth junction, often became weak and broke.

Once the soft tissue has matured around the provisional, the provisional is removed and the coping (the cementable restoration minus the veneer material) is placed on the custom abutment (**Figure 7**). A centric relation record is made, followed by an impression picking up the coping (tissue impression). Both of these are sent to the lab. There is a huge advantage in making this tissue impression with a coping that is made in the lab on a custom abutment. This allows the practitioner when chairside to be assured that even if the custom abutment margins are subgingival, the coping and tissue impression will capture the finish line on the custom abutment margin. Many claims are made by manufacturers about the ease of use of prepable abutments chairside. Not only are prepable abutments difficult to prep at the chair, but if the margin is placed subgingival, cord packing and retraction procedures around implants are difficult. There is no periodontal ligament to limit the cord or to pack against. With the above method, the coping acts as an impression coping, capturing the abutment finish line regardless of its placement.

The lab fabricates a tissue cast from the tissue impression using lab resin and a paper clip or lab bur. No implant or abutment lab analogs are needed. The lab applies a veneer material to the coping on a model that represents the mature tissue around the custom abutment. These procedures are done in the laboratory ceramic department using conventional lab procedures and conventional pricing, not in the implant department with implant pricing. This difference can reduce the lab bill. Most laboratory procedures involving implant fabrication have surcharges and cost more than conventional procedures. The final restoration is then ready to be placed on the custom abutment (**Figure 8**). Cotton or restorative material is placed over the screw access opening of the custom abutment. A soft (temporary) or hard (definitive) cement may be used to retain the final restoration.

For multiple-implant restorations, only two or three appointments are needed. For single implants that did not have an orientation guide made at the time of surgery and multiple-unit implant restorations, the doctor will always make an impression during the first appointment after the allowed implant healing time. Only a plastic stock tray, impression material, and implant impression copings are needed. Pick-up impression copings are recommended over transfer impression copings because of their better accuracy. Corresponding healing abutments and impression copings should be used (Figures 9 and 10). Regardless of whether a one-stage or two-stage implant placement protocol is used, healing abutments should be in place.

The healing abutments are removed and an impression coping placed. For multiple implants, one healing abutment at a time is removed, starting with the most posterior implant. Slight downward pressure and rotation is used while inserting (with fingers) the impression coping into the implant. This allows for tactile verification of proper seating of the coping/implant interface.

Radiographic verification should be made to confirm proper seating. The tray is tried in and modified accordingly to allow


**Figure 9.** Healing abutments in place.


**Figure 10.** Corresponding impression copings in place.

**Figure 11.** Pick-up impression copings with a rigid registration material connecting the two.


**Figure 12.** Custom abutments in the laboratory.

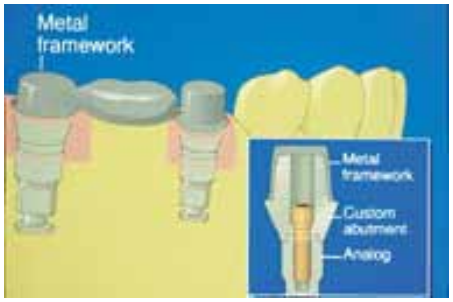



**Figure 13.** Framework on custom abutments in the lab.

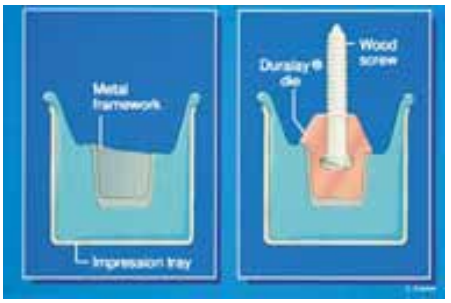



**Figure 14.** Left, cross-section view of tissue impression with picked up framework. Right, resin dies in framework prior to pouring tissue cast.

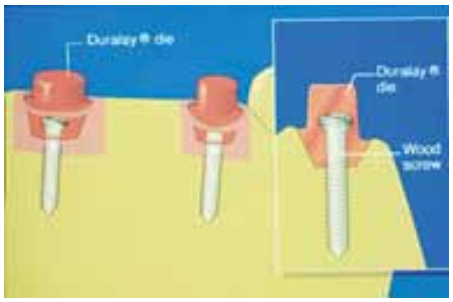



**Figure 15.** Tissue cast with framework removed.


**Figure 16.** Final restoration completed on the tissue cast in the laboratory.

for the screw in the impression coping to be loosened form the set impression material. If more than one impression coping is being used and they are adjacent, they should be connected to increase the accuracy of the impression procedure. A rigid registration material is recommended (Blue moose, Parkel, **Figure 11**), composite or cold cure resin can also be used. The impression is made and the copings picked up in the impression tray. The healing abutments are replaced, and jaw relations (centric or maximum intercuspal position records) are made. The patient is instructed to return in 10 to 15 working days for the second appointment.

The impression is sent to the laboratory and laboratory procedures are begun. Custom abutments can be fabricated in an ideal fashion. For all intents and purposes, these abutments are "prepped teeth" (**Figure 12**). Once the custom abutments are made, no special lab procedures are done. Procedures go back to conventional dentistry at conventional dentistry lab fees. If the restoration is being placed where esthetics is not a concern, the restoration is completed. If esthetics is a concern, or the clinical situation does not dictate finishing in two appointments, a framework (**Figure 13**) and provisional are fabricated along with the custom abutments. If the clinical situation does not dictate finishing in two appointments, a provisional will be placed on the custom abutment after the framework is tried in. This could be the situation if there are multiple implants that will be splinted together.

At the second appointment, the healing abutments are removed and the custom abutments are placed. This is done one implant at a time, starting with the most posterior healing abutment. The healing abutment is removed and the custom abutment is placed immediately. With many flat-top implant systems, the tissue can collapse around the implant, making seating of the restorative components difficult. Once the healing abutment is removed, the custom abutment should be

placed quickly. Radiographic verification of proper seating of the custom abutments should be made. Once confirmation of proper seating is made, the framework can be tried in, or, if completing, the final restoration is placed. The time allotted for this appointment is close to the amount of time allotted for conventional procedures of a similar situation. If one allows 30 minutes to try-in and cement a three-unit fixed partial denture on two abutment teeth, he or she should allow a similar amount of time when trying in and cementing a fixed partial denture on two implant custom abutments. For the practitioner doing these procedures for the first time, 45 minutes should be adequate. Placement of one or two custom abutments should take no longer than five to 10 minutes.

Often, the tissue will need to mature around a provisional for the practitioner to evaluate soft tissue contours. In this situation, the provisional is placed and the coping and or framework stored for a third appointment. The patient leaves with a provisional restoration, and the tissue is allowed to mature.

Once the tissue has matured, the patient returns for the third appointment. The provisional is removed, and the framework is placed. Jaw relations (centric or maximum intercuspal position records) are done, and the framework picked up in with a tissue impression as previously described (**Figure 14**). The margin placement can be 1 mm plus subgingival, and no retraction cord is needed. The framework is made in the lab to fit the custom abutment perfectly.

Once an impression is made, the provisional is placed and the patient told to return in 10 to 15 working days. The framework in the tissue impression is sent to the lab, and a tissue model is made (**Figure 15**). No implant or abutment analogs are needed. Resin dies are made, and the cast is mounted in the proper fashion. The final veneer material is placed, and the restoration is completed. The restoration is now ready to be placed (**Figure 16**). Time allowed for the insertion procedure on multiple implants is similar to that allotted for a similar conventional procedure on multiple-tooth preparations.

For single restorations, a final cement of the practitioner's choice can be used. For multiple units, a soft cement such as Optow Trial Cement (Teledyne Getz, Elk Grove Village, Ill.), Improv (Steri-Oss, Yorba Linda, Calif.). or Provolink (Ivoclar Vivadent, Amherst, N.Y.) is recommended. Zinc-oxide eugenol-based cements can be used but can be more difficult to remove. Multiple-unit restorations should be removed annually to check the individual implants for mobility.[5]

Cemented restoration have many advantages and few disadvantages.[6-8] One contraindication for cemented single- or multiple-implant restorations is a restoration with very little interarch distance. If a similar situation was found in a conventional dental situation, the practitioner would use the most retentive cement available. With implant dentistry in areas where minimum retention can be achieved on the custom abutments, the option of screw retention is used. Screw-retained restorations offer the ultimate in retention. Multiple-unit implant restorations that are cemented with soft cements can be difficult to remove. A new instrument from Kavo, the Coronoflex (Kavo America, Lake Zurich, Ill.), makes removing these restorations easier.

The above procedures describe implant dentistry performed similarly to conventional dentistry. Only two or three goal-oriented appointments of no longer than an hour are needed. Most manufacturers have components that allow for these types of restorations. For practitioners who have had frustrations in the past with restorative implant procedures, times have changed. Today, implant restorative procedures can be easy for the patient, staff, and dentist.

## References

1. Personal communication. Presidents and or CEOs of Ivoclar North America, Noble Biocare Steri-Oss, Implant Innovations Inc., and Astra Tech.
2. Hochwald DA, Surgical template impression during stage I surgery for fabrication of a provisional restoration to be placed at stage II surgery. J Prosthet Dent, 66(6): 796-8, 1991.
3. Reiser G, Dornbush JR, and Cohen R, Initializing restorative procedures at first stage surgery with a positional hex: A case report. J Perio Rest Dent, 12(4):279-93, 1992.
4. Prestipino V and Ingber A, Implant fixture position registration at the time of fixture placement surgery. Pract Perio Aesthetic Dent 4(9):23-7, 1992.
5. Jemt T, Linden B, Lekholm U, Failure and complications in 127 consecutively placed fixed partial prostheses supported on Branemark implants: from prosthetic treatment to first annual check-up. Int J Oral Maxillofac Implants 7:40-4, 1992.
6. Pauletto N, Lahiffe B, Walton J, Complications associated with excess cement around crowns on osseointegrated implants: a clinical report. Int J Oral Maxillofac Implants 14:865-8, 1999.
7. Keith S, Miller B, et al, Marginal discrepancy of screw-retained and cemented metal-ceramic crowns on implant abutments. Int J Oral Maxillofac Implants 14:369-78, 1999.
8. Hebel KS, Gajjar RC, Cement-retained versus screw-retained implant restorations:
Achieving optimal occlusion and esthetics in implant dentistry. J Prosthet Dent 77:28-35, 1997.

To request a printed copy of this article, please contact/Curtis E. Jansen, DDS, 34 Dormody Court, Monterey, CA 93940.

CDA JOURNAL, VOL 28, Nº4

# Observations on Achieving Total Practice Success

RANDALL K. BERNING, JD, LLM

AUTHOR

**Randall K. Berning, JD, LLM,** is president of Berning & Affiliates, Inc., a national health care consulting firm serving dentists and dental specialists. He is an adjunct professor of dental jurisprudence and director of practice administration at the University of Illinois College of Dentistry and adjunct faculty at the University of California at San Francisco and the University of Maryland.

What makes up total practice success? I've been asked this question repeatedly and have accumulated observations and studied practices for answers for 20 years. What follows are thoughts on practical action-oriented steps a doctor can take to define and achieve success for his or her given situation and practice. The basis for the inquiry is the common observation that there are those doctors in practice who are getting along fine for the most part, and then there are those that seem to have arrived at a different plane -- one in which they have achieved an integrated and well-developed growing practice that is also personally fulfilling. What is it that has enabled one doctor to have a dream-come-true practice and another a passable, perhaps only marginally fulfilling, practice and career?

Observation. To achieve anything of importance, a doctor or a group of doctors must have a known result that provides what the practice is to be and how that translates into an overall strategy. The description here of the "what" can be easily confused with a business-planning vision process. One contemporary business-planning writer states that vision is "The view of the future of the organization, which stresses what the visionary wants the organization to become. It is the integration and synthesis of information and dreams."[1]

But, in the professional practice context, more is at work than merely the vision for a business enterprise because the individual and family goals of the professional often act to override otherwise valid business-planning goals. In some cases, the individual and family goals become primary, placing the business in a merely adjunctive position.

The known result referred to above is more than some of the typical quests. Typical quests include, for example, the younger professional's dream of being in practice; the mid-term doctor's goal of keeping the practice going, getting better facilities and equipment, and maybe

CDA JOURNAL, VOL 28, Nº4

having an associate or partner; or the end-stage doctor's goal of finding out how to transition out of practice.

Instead of what, most doctors start with thinking how they want to go about doing something. For example the mid-term doctor's efforts at keeping the practice going, upgrading a facility, implementing a powerful marketing program, or planning for an associate or partner all begin with a thing(s) to do. But this is not the course very successful practices follow. Instead of how, most very successful practices -- intuitively or deliberately -- have a what that guides all decisions. For example, consider the following what statement: "This practice will be the friendliest, most accommodating practice patients have ever encountered." That kind of what touches every aspect of the practice. Friendly and accommodating means the facility is well-located, hours of care fit the demographic area of the patient area, and staff and doctor are consistently outreaching and helpful. The practice communication and marketing themes and materials, including a Web site, have a tone that carries through the core what of the practice. People reading or learning about the practice who are seeking a friendly and accommodating dental office will have their first impression from marketing materials confirmed when they experience the real staff and doctor because the what has been a consistent guiding strategy.

In short, there is a big difference in approaching setting the direction of a practice and a career by thinking how vs. thinking and implementing a what action-based approach. Doctors guided by how mostly have only an operational paradigm, often reduced to thinking "How will I do more than last year." This generally means, how will I see more patients, do more production, and make more net income. It does not have to be a difficult step to break out of the rut of thinking how to thinking what. It takes a commitment to re-think the fundamental aspects that drive the practice and, after nailing them down, returning to setting how-to objectives that will favorably implement the driving force for the practice.

**Observation**. Too many doctors and groups cannot specifically state what they want in totality.

An unusual aspect of professionals in practice is that the business aspects and personal aspects blend at important points. The blending, in an overly simplistic view, occurs in three pivotal areas: the practice, the family, and the self. Conflict immediately arises when a doctor states an ambitious development or growth plan for the practice, implements the plan, achieves some success, and then grouses that there is not enough time to enjoy personal hobbies or family time.

In contrast, starting with a comprehensive view and asking the following type of probing question will prevent the tug of war between practice quests and personal goals and can give an entirely different result. "What should this stage of my life be like (starting career, mid-point, or exiting) for each of the three areas (practice, family, and self)?" This type of question recognizes the need for inherent balance between the three areas and that during certain stages one area may in fact be the driving force. Asking this question frequently can help keep the professional focused and, in the words of Ben Franklin, keep the mental "key" bright. Communicating this same approach to staff and family can often relieve significant pressure and doubts.

The point of arranging for personal and family areas to receive attention in the process of practice planning can be critical in the group practice context. Individual practitioners tend to be a world unto themselves and can affect their situation with singular effort. Many groups tend to be mere loose affiliations based on economic interest rather than integrated enterprises that recognize the fundamental requirement of meeting younger and established doctors needs, both professionally and personally, to consistently maintain success. Nowhere is this more important than in groups with new female doctors. The need to blend and not fight the personal needs of these doctors for family and personal time can make or break a group over time. As most dentists are aware, there have been significant changes in the ratio of men to women in dental school graduating classes during the last 10 years. These changes have manifested themselves in the composition of dental practices and must be taken into account in planning for any practice growth and development strategy and practice transition and succession-planning strategy.[2] In groups governed only by economic interests, there is often a lot of flailing about and tensions not directly attributable to the practice in significant part because the practice needs tend to overshadow the legitimate demands of the personal and family life of the practitioner. The more specificity of the known result for the practice and the better the effort at seeking to incorporate a complete overview of the life and career of the doctor(s), the better the long-term practice-planning result.

**Observation**. Part of any contemporary well-thought-out what includes planning for various growth, transition, or succession results.

Simply put, early planning in the areas of growth, transition, or succession allows for a successful result, particularly since these initiatives are part of both the business and the family sides of a professional's life. With a view toward early

planning for each category of transition or succession, there are items that can help younger and senior practitioners arrive at the desired result. They are provided below.

## Associateship

Given the increasing population growth from domestic births and immigration, both younger professionals and practice owners have to rethink the approach of the last decade that it was more cost- and time-effective for most young professionals to join an existing practice rather than start a practice from scratch.[3] With high student debt, many younger professionals still assume that their only option is associateship and then ultimately a buy-in or buy-out of an existing practice. In fact, with far greater availability of funds from finance companies and banks than in the past, there is a significant argument for younger professionals to negotiate harder for an immediate practice buy-in to the larger practice or specialty practice or purchase the entire practice coupled with a hire back of the senior doctor when economically appropriate. This approach can expedite getting the younger professional into an equity position to allow for faster school and practice debt repayment and it can facilitate a significantly less encumbered exit for senior practitioners. Although group and specialty practice partnership buy-in and buy-out arrangements are appropriate in many cases, the time and cost can be significant in contrast to straight purchase, sale, and re-hire transactions when appropriate arrangements are made for protecting both parties.

Owners seeking an associate are well-advised to have the following items prepared and ready to provide to the prospective party:

- A draft associate agreement prepared by a competent adviser;
- Background information on how a fair level of compensation was arrived at and a break-even analysis, both of which can be provided from a neutral and authoritative source, the American Dental Association publication, Associateships: A Guide for Owners and Prospective Associates.[4]
- For those prospects interested in moving from an associate to an owner, what the time frame is for the right associate to become a partner or purchaser of the practice.

## Partnership and Related Options, Including Solo Group and Sale

Partnership and other forms of group practice can occur in many situations, including the following:

- When a practitioner is younger and has experienced significant practice growth to the point that the practice is more than can be handled comfortably by the solo doctor;
- When a practice of whatever kind wants to "control" or significantly affect a practice market area;
- When specialists see the wisdom of not allowing competition in a market area because of lack of coverage or capacity; and
- When end-stage practitioners are looking to transition out of practice and want a buy-out arrangement to cover a period of several years.

In all of the foregoing situations, issues occur relating to how best to maintain the momentum of the practice, capitalize on the return of the investment made, and optimize transition of the goodwill.

Owners in the above situations should keep the following in mind:

- An overall business-planning effort tied to an approach for the entry of new doctors;
- The compensation needs of all doctors and retirement timeline for founder doctor; and
- A contractually established valuation methodology that meets the contingencies for use in the following areas: buy-in, buy-out, permanent disability, death, voluntary exit, and true retirement.

The overall business plan is needed because a solo doctor practice, and even a solo owner with an associate practice, is not the equivalent of a group of equity owners where consensus as to practice direction and an established approach to buy-in and buy-out, compensation, and retirement issues are essential for the future security of all group members. The need to avoid the primary area of dispute within groups that are undergoing transition or succession planing, namely how to arrive at value, is materially facilitated with a well-recognized methodology. All doctors -- younger, mid-term, and those planning for retirement -- should read and be familiar with valuation methodology applied to dental practice as discussed in the American Dental Association publication Valuing a Practice, A Guide for Dentists, particularly Chapter 3: Valuation Methods and Chapter 4: Factors Complicating the Valuation Process.[5]

Solo practitioners who wish to maintain control of their practices up to the point they retire or leave practice and do not relish having a partner have several options. Some practitioners may desire an immediate sale. That well-understood route can often be achieved without great difficulty, with one caveat. If the practice is larger or uses unusual procedures or materials, it can be challenging to find a younger practitioner that can purchase the practice and immediately be effective producing patient care at or near the same level of the exiting doctor while handling

CDA JOURNAL, VOL 28, Nº4

significant burdens in overall practice management, particularly personnel management. Therefore, a hire-back of a well-defined nature in duration and scope of assistance should be provided, and any marketing or other services should be developed as part of the hire-back employment agreement. If the practice is smaller or the founder wants to have a "hobby" practice, exploring a solo-group format can be beneficial. A solo-group approach to sharing expenses and having a buyer in place for the sale of whatever is left of the practice on exit can generally be beneficial only if getting every last dollar from a practice sale is not a priority.

## Summary

A doctor or group practice that understands the design of what the practice wants to be and develops a strategy to accomplish that end will invariably achieve a high level of performance. Performance areas in contemporary practice administration cover a wide area including growth, transition, and succession. Due to the wide and demanding areas in practice administration, it is important to address any practice planning effort in a comprehensive manner rather than a piecemeal approach. The foregoing will materially assist any practitioner to achieve the level of success they seek.

## References

1. Burton EJ, Total Business Planning: A Step-By-Step Guide With Forms, 3rd ed. John Wiley & Sons, 1999.
2. American Dental Association, 1997 Survey of Dental Practice, Characteristics of Dentists in Private Practice and Their Patients. Chicago, 1997.
3. For one of the more recent discussions of the broad sweeping changes in the country's demographics and aspects of finance, see People patterns: How to play the changing demographics in the coming years. Wall Street Journal Nov. 29, 1999, Personal Finance Section.
4. Berning RK and Domer LR, Associateships: A Guide for Owners and Prospective Associates. American Dental Association, Chicago, 1996, Chap 6.
5. Domer LR, Berning RK, Valuing a Practice: A Guide for Dentists. American Dental Association, Chicago, 1997.
To request a printed copy of the article, please contact/ Randall K. Berning, JD, LLM, Berning & Affiliates, Inc., 3400 Tamiami Trail N., Suite 201, Naples, FL 34103.

CDA JOURNAL, VOL 28, Nº4

# Crown Lengthening to Facilitate Restorative Treatment in the Presence of Incomplete Passive Eruption

TIMOTHY J. HEMPTON, DDS, AND FINN ESRASON, DMD

**ABSTRACT** Crown-lengthening surgery can be utilized to expose subgingival caries. In this clinical case, a patient presented with incomplete passive eruption in the maxillary anterior sextant. This case illustrates that when incomplete passive eruption is present and restorative treatment is necessary in the maxillary anterior sextant, crown-lengthening surgery not only provides exposure of subgingival caries but can also result in a more esthetic therapeutic outcome.

AUTHORS

**Timothy J. Hempton, DDS** is an assistant clinical professor in the Department of Periodontology at Tufts University School of Dental Medicine. His private practice is limited to periodontology and implantology, and is located in Dedham, Mass.

**Finn Esrason, DMD,** is a clinical instructor in the Department of Restorative Dentistry at Tufts University School of Dental Medicine. His private practice in restorative dentistry is located in Randolph, Mass.

The periodontal-restorative interrelationship involves the utilization of periodontal therapy to facilitate restorative treatment. Subgingival caries or fractures can be properly restored with surgical crown lengthening. Osseous recontouring is indicated if intraosseous defects are present or if the fracture or caries is within close proximity to the osseous crest. In the maxillary anterior sextant, periodontal surgery for the treatment of osseous deformities, for crown lengthening, or for a combination of both therapies, may effect an esthetic compromise. A complicating result of this treatment is root exposure and loss of interdental tissue.[1,2] A prosthetic solution to this postsurgical dilemma would involve fabricating porcelain-fused-to-metal cast restorations, which extend apically involving preparation of the exposed root. In addition, the restorations are wider mesiodistally to close the unesthetic gingival embrasure areas, which appear as black triangles.[3,4]

The anatomical crown extends from the cementoenamel junction to the incisal edge. The clinical crown extends from the free gingival margin to the incisal edge. Healthy gingival tissues normally present with the free gingival margin located

slightly coronal to the cementoenamel junction. However, the free gingival margin can extend coronally to cover one-third to one-half of the enamel, resulting in excess gingival display. When this occurs, the length of the clinical crown is significantly shorter than the anatomic crown. When excess gingival display (also referred to as incomplete passive eruption) is present in the maxillary anterior sextant, crown lengthening for surgical management of subgingival fractures or caries does not necessarily effect an esthetic compromise. By contrast, exposing enamel previously covered with excess gingiva not only provides the periodontal solution to the restorative problem but can also improve the esthetic appearance of the maxillary anterior dentition.[5,6]

## Incomplete Passive Eruption

### *The Dentogingival Junction*

The dentogingival junction refers to the combined average occlusoapical measurements of two supracrestal periodontal structures. These structures include the junctional epithelium and the supracrestal connective tissue attachment. Gargiulo and colleagues studied the dimensions of the dentogingival junction in humans.7 He noted the following: the length of the junctional epithelium attachment averaged 0.97 mm, and the connective tissue attachment averaged 1.07 mm. The combined average was 2.04 mm. The study also included a measurement of the average dimension of a healthy sulcus. This value was 0.69 mm. To review, the sulcus extends from the most coronal aspect of the junctional epithelium to the free gingival margin. The junctional epithelium and the connective tissue attachment located apical to the junctional epithelium function as the supracrestal attachment apparatus. Each component averages 1 mm.

### *Dental Eruption, Active and Passive*

The apical migration of the structures of the dentogingival junction relate to dental eruption. Eruption of teeth can be divided into two phases, active and passive. Active eruption terminates when the tooth makes contact against the opposing arch. Passive eruption involves the apical movement of structures of the dentogingival junction without any vertical movement of the tooth. As the dentogingival junction migrates apically exposing enamel, the dentition appears longer. Completion of this process occurs when the dentogingival junction approximates the level of the cementoenamel junction. When the sulcular and junctional epithelium still remain significantly coronal to the cementoenamel junction, passive eruption is delayed or referred to as incomplete passive eruption.

### *Clinical Appearance of Incomplete Passive Eruption*

Clinically, incomplete passive eruption can be described as an anatomical condition where the free gingival margin is located greater than 2 mm coronal to the cementoenamel junction. Volchefsky and Cleaton-Jones noted a 12 percent incidence of incomplete passive eruption occurring in the population they observed.[8] They discussed the possibility that incomplete passive eruption could be a risk factor for necrotizing ulcerative gingivitis.

In general, incomplete passive eruption is nonpathologic and can be described as an anatomical aberration. The crown of the tooth is not completely exposed, resulting in an appearance of short teeth. Evian described this entity as having the appearance of drug-induced gingival hyperplasia.9 Viewing the position of the cementoenamel junction on the radiographs can facilitate diagnosis of this condition. If the clinical crown length is less than the crown length measured on the radiograph (i.e., the anatomical crown), then incomplete passive eruption is present. The exact etiology of this condition is unknown. Intrusion induced by orthodontic treatment may be a factor in the development of this relationship between the cementoenamel junction and the free gingival margin.

### *Incomplete Passive Eruption and Restorative Interactions*

Dello Russo presented concerns about subgingival placement of crown margins in the presence of incomplete passive eruption.[10] Subgingival crown margins are potentially plaque-retentive and can increase the risk for the development of gingival inflammation and subsequent attachment loss.[11] The gingival tissues apical to the crown margin are adjacent to enamel and therefore are not attached by connective tissue.

The inflammatory response initiated by the presence of plaque could result in the disassociation of the junctional epithelium from the enamel. The junctional epithelial attachment is not as strong as a connective tissue attachment, and pocket formation may ensue.

Malament noted that this condition can confound proper fixed prosthetic therapy.[12] Short teeth can lead to inadequate retention and resistance form when full cast restorations are planned. Proper embrasure space development is also complicated in the presence of excess gingival tissues. Moreover, esthetics are less than ideal when teeth have a short appearance. It gives the appearance of significant wear due to bruxing or attrition. When this condition is present in the maxillary anterior sextant, esthetics play a critical role in treatment-planning.

## A Review of Crown Lengthening Modification of the Osseous Tissues, Osseous Resection

A crown-lengthening procedure refers to the surgical alteration of the periodontium to facilitate definitive exposure of the dentition. This treatment often involves modification of the investing osseous structures. To better understand this process, several terms will be reviewed. Osseous resection refers to the removal of bone with rotary and hand instrumentation. Osteoplasty refers to removal of nonsupporting bone (i.e., bone which is not directly attached to the root via the periodontal ligament). Ostectomy is the removal of supporting bone.

**Figure 1.** A 21-year-old male patient with incomplete passive eruption in the maxillary anterior sextant resulting in short clinical crowns. Class V carious lesions extending subgingivally were noted on teeth Nos. 6, 7, 8, 9, and 11. Moderate loss of interdental tissue between teeth Nos. 8 and 9 is evident.

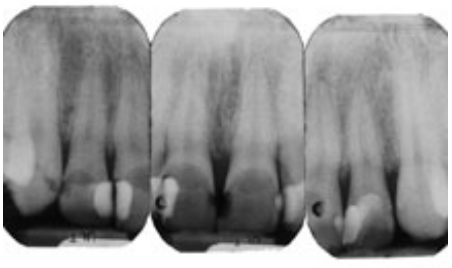


**Figure 2.** Periapical radiographs of the maxillary anterior dentition reveal that the lengths of the anatomic crowns are 2 to 3 mm longer than the lengths of the clinical crowns. Note the presence of unexposed enamel located 2 to 3 mm apical to the carious lesions.

**Figure 3.** An inverse bevel incision was utilized to provide access to the underlying osseous structure. A palatal flap was not elevated.

**Figure 4.** Subsequent to elevation of the facial flap, enamel apical to the carious lesions was exposed. Moreover, the relationship between the osseous and the cementoenamel junctions could be observed.

Employment of a crown-lengthening procedure to expose subgingival caries involves a three-dimensional analysis of the problem. The three parameters include the occlusal apical dimension, the mesiodistal dimension, and the buccolingual dimension. This analysis facilitates flap design and determines the extent of osseous resection.

## Occlusal Apical Dimension: The Biologic Width

The first dimension is the occlusal apical dimension, and involves the "biologic width." Ingbar discussed the dentogingival junction from a periodontal and restorative perspective.[13] He described the average measurement of the dentogingival junction (2.04 mm) as the biologic width. He recommended that restorative treatment should not violate the biologic width (i.e., tooth preparation should not damage the junctional epithelium attachment or the connective tissue attachment). Moreover, he advised placement of supragingival margins and recommended that a minimum dimension of 3 mm coronal to the alveolar crest is necessary to permit healing and proper restoration of a tooth. Nevins and Skurow proposed that the biologic width should be considered 3 mm in length, measured coronally from the alveolar crest.[14] This would allow for restorations to be placed at least 1 mm away from the attachment apparatus within the gingival sulcus.

Presently, a 3 mm measurement is generally agreed upon as the desired distance between the restorative margin and the osseous crest. These 3 mm account for the sulcus (1 mm), the junctional epithelium (1 mm), and the connective tissue attachment (1 mm). Flap elevation is necessary to observe the location of the osseous crest relative to the proposed restorative margin. To facilitate this, surgical flap elevation is necessary to view the osseous tissue. Moreover, osseous recontouring cannot be accomplished with a gingivectomy procedure, as a gingivectomy procedure will not afford adequate access.

## The Mesiodistal Dimension: A Scalloped Osseous Morphology

The second dimension is the mesiodistal dimension. If caries extends toward the interproximal area, re-establishment of positive osseous architecture must be accomplished to facilitate proper wound healing. Positive osseous architecture refers to the normal position of the osseous crest relative to the cementoenamel junction. In health, the osseous crest is usually located 1.5 to 2 mm apical to the cementoenamel junction. The cementoenamel junction on the proximal surfaces of the dentition is coronal to the level of the cementoenamel junction on the facial and lingual surfaces. The osseous crest reflects the location of the cementoenamel junction, resulting in a scalloped or parabolic appearance. The measured difference between the level of the cementoenamel junction on the proximal surface and the cementoenamel junction on the approximal surface is greater in the anterior sextants. This results in a more scalloped appearance of the crestal osseous morphology. In the posterior sextants the scalloping is not as extensive, resulting in a relatively flat appearance. Rosenberg recommended re-creating the scalloped appearance at a more apical level during crown lengthening procedures.[15] He was, in effect, referring to altering the osseous morphology in the mesiodistal dimension as the caries or fracture approaches the interproximal areas.

## The Buccolingual Dimension, Osseous Ledging, Osseous Torri

The third dimension is the buccal lingual dimension. An osseous topography consisting of bony ledges that are wide in the buccolingual dimension will present with concomitant excess gingival display in an occlusal apical dimension. Failure to

**Figure 5.** Osseous recontouring was performed around teeth Nos. 6, 7, 8, 9, 10, and 11, resulting in a minimum distance of 2 mm from the osseous crest to the cementoenamel junction. As the caries did not extend onto the proximal surfaces, the interdental tissues were left intact to preserve aesthetics.

**Figure 6.** The facial flap was positioned at the cementoenamel junction, utilizing 4-0 expanded polytetrafluoroethylene sutures.

**Figure 7.** Postoperative view at 12 weeks. The anatomic crown is completely exposed (i.e., the clinical crown length approximates the anatomic crown length).

**Figure 8.** Restorative treatment has been completed. Composite restorations were placed on teeth #6, 7, 8, 9, and 10. The diastema closed between teeth Nos. 8 and 9.

reduce the thickness of the osseous ledging will affect the healing of the overlying gingiva. The maximum reduction of the occlusal apical postoperative gingival height will not be achieved. A reduction of the osseous ledges in conjunction with treatment of the occlusal apical and, if needed, the mesiodistal dimension will affect the optimal position of the free gingival margin postoperatively.

A clinical situation could present with significant osseous ledging with the osseous crest located 3 mm apical to the proposed restorative margin. In this case, reduction of the buccolingual dimension without osseous resection in the occlusal apical dimension will result in the optimal occlusal apical position of the gingival tissue without removal of the supporting bone (ostectomy). If there is thick bone and ledges are not reduced, the underlying osseous topography will influence the overlying gingival tissues as they heal. By thinning the bone in a buccolingual dimension, the overlying gingival tissues will heal at a more apical level.

In cases of incomplete passive eruption, the osseous crest may be located at or within close proximity to the cementoenamel junction.[16] Removal of supporting bone will not significantly affect the stability of the invested dentition.

In the case of the maxillary anterior sextant, removal of bone in the interproximal area is a concern, as it can result in a black triangle in the gingival embrasure area. In cases where caries is limited to the facial aspects of the maxillary anterior dentition, a flap can be elevated on the facial aspect only. The interdental bone and overlying soft tissues (the papillae) can be left intact. If caries does extend to the proximal surfaces or onto the palatal surface, elevation of a palatal flap and interdental denudation will need to be performed. In addition, removal of bone in the interdental will also have to be done. Under these circumstances, recession or loss of papilla will occur in the interdental area. To compensate for these anatomical changes, the crowns placed in the area may have to be fabricated with contours modified to eliminate or reduce the black triangle.

## Case Report

The patient was a 21-year-old white male in good health. He presented for an initial consultation in September of 1997. At that time, class V carious lesions were noted on teeth Nos. 6, 7, 8, 9 and 11. These lesions extended subgingivally (**Figure 1**). The gingival tissues were only slightly inflamed. The overall tone of the gingival tissue was fibrotic in nature. Some loss of the interdental papillae can be seen between teeth Nos. 8 and 9. The maxillary anterior dentition appeared short. Minimal wear patterns were noted on the incisal edges of these teeth.

Periapical radiographs indicated that enamel was present apical to the carious lesions (**Figure 2**). The length of the clinical crowns measured on the radiographs was 2 to 3 mm longer than the clinical crowns. A periodontal probe placed apical to the free gingival margin detected the topography of the cementoenamel junction, which was apical to the caries.

To provide proper exposure for adequate restorative treatment, a crown lengthening procedure was recommended. This procedure included teeth Nos. 6 through 11. Caries was not present on the palatal aspects of the maxillary anterior dentition; therefore, a palatal flap was unnecessary. Moreover, access to the facial lesions could be obtained with elevation of a facial flap, leaving the interdental papilla intact. This flap was designed to prevent loss of interdental tissue with the concomitant appearance of black triangles (**Figure 3**). The incision was an internally beveled scalloped incision, which extended from the mesial aspect of tooth No. 5 to the mesial aspect of tooth No. 12. One to 2 mm of marginal tissue were excised after the initial incision.

Access to the underlying osseous structure is critical in treatment of' incomplete passive eruption (**Figure**

4). Often the cementoenamel junction will be located within less than 2 mm to the osseous crest. In normal osseous architecture, the osseous crest follows the cementoenamel junction and is located 2 mm away from it. This gives the osseous morphology a scalloped or parabolic appearance. At various locations it was noted, however, that the cementoenamel junction was less than 2 mm away from the osseous crest on the facial aspects of teeth No. 6 through 11. The bone was not unusually thick in the buccolingual dimension.

A hand chisel was utilized to recontour the bone on the facial aspects of teeth Nos. 6 through 11 (**Figure 5**.) The facial flap was positioned at the cementoenamel junctions of teeth No. 6 through 11. A 4-0 expanded polytetrafluoroethylene suture was utilized to position the facial flap. Interrupted sutures were employed and engaged the remaining interdental tissue. After 12 weeks the patient presented for an evaluation (**Figure 7**). All carious lesions were exposed as well as 2-3 mm of enamel that was previously subgingivally located. The patient was subsequently referred to the restorative dentist for placement of composite restorations on teeth Nos. 6, 7, 8, 9 and 10 (**Figure 8**).

## Summary

Crown-lengthening surgery can be utilized to expose subgingival caries. In this clinical case, a patient presented with incomplete passive eruption in the maxillary anterior sextant. The carious lesions did not generally extend toward the proximal surfaces to such a degree that resection of interdental tissue was warranted. As a result, it was necessary to elevate only a facial flap, thereby preserving interdental tissue. This case illustrates that when incomplete passive eruption is present and restorative treatment is necessary in the maxillary anterior sextant, crown-lengthening surgery not only provides exposure of subgingival caries but can also result in a more esthetic therapeutic outcome.

## Acknowledgment

The authors wish to thank Dr. Sandra Cove for her help in preparing this manuscript.

### References

1. Swenson HM, Hansen NM, The periodontist and cosmetic dentistry. J Perio 32.82-4, 1961.
2. Schweitzer MM, Esthetic and hygiene after extensive periodontal treatment. J Prosth Dent 10:284-90, 1960.
3. Shillingburg HT, Jacobi R, Brackett SE, Fundamentals of Tooth Preparations for Cast Metal and Porcelain Restorations. Quintessence, Chicago, 1987.
4. Rosenberg MM, Kay HB, et al, Periodontal and Prosthetic Management for Advanced Cases. Quintessence, Chicago, 1988.
5. Allen ER, Use of mucogingival surgical procedures to enhance esthetics. Dent Clin N Am 32:307-30, 1988.
6. Weinberg MA, Fernandez AR, Scherer W, Delayed passive eruption: an old concept with a distinct guise. Gen Dent 44:352-5, 1996.
7. Gargiulo AW, Wentz FM, Orban B, Dimensions and relations of the dentogingival junction in humans. J Perio 32:262-7, 1961.
8. Volchefsky A, Cleaton-Jones R, The position of the gingival margins expressed by clinical crown height in children ages 6-16 years. *J Dent* 4:116-22, 1976.
9. Evian CI, Cutler SA, et al, Altered passive eruption: the undiagnosed entity. *J Am Dent Assoc* 124:107-10, 1993.
10. Dello Russo NM, Placement of crown margins in patients with altered passive eruption. Int J Perio Rest Dent 1:59-65, 1984.
11. Newcomb GM, The relationship between the location of subgingival crown margins and gingival inflammation. J Perio 45:151-4, 1974.
12. Malament K, Considerations in posterior glass-ceramic restorations. Int J Perio 8:33-49, 1988.
13. Ingbar FJS, Rose LF, Coslet JG, The biologic width. A concept in periodontics and restorative dentistry. Alpha Omegan 10:62-5, 1977.
14. Nevins M, Skurow HM, The intracrevicular restorative margin, the biologic width, and the maintenance of the gingival margin. Int J Perio Rest Dent 4:30-49, 1984,
15. Rosenberg ES, Garber DA, Evian CI, Tooth lengthening procedures. Compend Contin Educ Dent 1:161-73, 1980.
16. Coslet JG, Vanarsdall R, Weisgold A, Diagnosis and classification of delayed passive eruption of the dentogingival junction in the adult. Alpha Omegan 10:24, 1977.
To request a printed copy of this article, please contact/ Timothy J. Hempton, DDS, 347 Washington St., Suite 103, Dedham, MA 02026.

CDA JOURNAL, VOL 28, Nº4

# Customized Abutments to Shape and Transfer Peri-Implant Soft-Tissue Contours

Lambert J. Stumpel, III, DDS; Walter Haechler, MDT; and Edmond Bedrossian, DDS

**ABSTRACT** With the functional successes of implant therapy (being realized) assumed, the emphasis is shifting to creating (to the creation of) tooth-like esthetics with implant therapy. Dental implants are placed after careful planning and site preparation, which may include bone and soft tissue grafting. The final soft tissue appearance is enhanced through the early use of provisional restorations. A combination technique is described to fabricate provisional healing abutments for cement-on prostheses and (to) transfer the individualized peri-implant soft-tissue contours to the dental laboratory. This technique will allow the practitioner to deliver highly customized implant care with familiar techniques and readily available materials.

AUTHORS

**Lambert J. Stumpel, III, DDS,** is a director of implant prosthetics at the Alameda Medical Center Oral and Maxillofacial Surgery Residency Program. He is also an assistant clinical professor at the University of California San Francisco School of Dentistry. He maintains a private practice in San Francisco.

**Walter Haechler, MDT,** is a master dental technician in Corte Madera, Calif.

**Edmond Bedrossian, DDS,** is the director of the implant program at the Alameda Medical Center Oral and Maxillofacial Surgery Residency Program. He is also an assistant clinical professor at the UCSF School of Dentistry. He maintains a private practice in San Francisco.

Implant therapy has evolved greatly since its inception.[1] Dental professionals have become accustomed to the successes attainable on a functional level and are increasing their expectations with regard to esthetics. Dentists and their patients expect implant restorations to look and feel like natural teeth. (The) Differences between the position and shape of teeth as opposed to (when compared with) implants (illustrates the) create challenge(s) for the practitioner trying to create the "invisible" restoration.[2] As expectations have increased, therapies have evolved from fixed hybrids to single teeth and from standard to fully customized abutments. If dentists want their restoration to look like natural teeth, they will have to restore all the parameters that make up a natural esthetic. Emergence profiles must coincide, as must gingival contours. Since most of the time there is quite a difference between the dentulous and edentulous site, a myriad of techniques are used to prepare the site to mimic the dentulous environment, including bone grafting, different size implants, individualized prosthetics, and soft tissue grafting. With these techniques comes increased interest in soft-tissue contouring and transferring methods.[3-10] The objective of this article is to present a simple, predictable technique to contour

**Figure 1.** The wax up of missing tooth structure. The cast is obtained from the impression taken during stage I surgery.

**Figure 2.** The clear matrix is perforated by the screwdriver for the laboratory implant screw.

**Figure 3.** The coronal part is cured. Note the incisal exit of screw access hole, indicating ideal implant angulation for a cement-on prosthesis.

**Figure 4.** The emergence profile of the abutment has been developed, guided by the fixture position and the cementoenamel junction of the tooth.

**Figure 5.** Conventional crown preparation finalized the laboratory phase of the provisional abutment. The provisional coronal restoration is fabricated concurrently.

**Figure 6.** Stage II surgery. Connection of the provisional abutment, with a papilla-sparing incision.

soft tissue and transfer this contour to the dental laboratory by utilizing standard components and familiar techniques, thereby minimizing the number of components and (the) size of the armamentarium. The simplified technique enables more patients to receive the benefits of the state of the art in dental implant therapy.

## Rationale

The position and shape of the prosthetic tooth is determined by a verified wax-up of the missing tooth structure. This information is used to fabricate the surgical stent that will guide the placement of the fixtures into the ideal position. During the presurgical work-up, deficient structures are evaluated. Three tissue types are considered. The first type is the missing tooth: The position and shape of the restoration is determined by the existing dentition. The second type is the hard tissue. If there is any question as to the volume of bone present, the width of the residual alveolus can be evaluated in the third dimension using either CT scans or tomography. The third type is the soft tissue. The evaluation of the soft tissue includes the position of the papillae adjacent to the edentulous area, the width of the attached gingiva, and the thickness of the gingiva. In treatment-planning and the execution of the surgical care, specific management of all three tissue types is considered. Additional surgical techniques can be employed to re-establish the most ideal topography in conjunction with the actual fixture placement. Site preparation and enhancement techniques of the hard and soft tissue before and after fixture placement set the stage for the prosthetic tissue contouring and reconstruction. The implant is merely a receptacle for the prosthesis. It must be placed apical to the cementoenamel junction of the adjacent teeth to allow adequate distance for the flaring of the prosthesis from the circular platform of the implant to the contact point of the adjacent dentition. It must allow for tooth contours and draping of the frame of surrounding soft tissue in a natural-appearing matter. Provisional restorations are essential in establishing smile lines and phonetics. Provisional abutments are created to guide and support the peri-implant soft tissue during healing, and they function as blueprints for the final custom abutments.

## Technique

### *The Custom Abutment*

1. The exact wax up of the missing tooth structure (**Figure 1**), with a clear demarcation of the cementoenamel junction, is transferred onto the cast of the fixture position (check that this is what he wrote “fixture position”). The impression for this cast may be obtained at fixture placement10 or within a few

**Figure 7.** Eight weeks post stage II.

**Figure 8.** The accepted provisional abutment on the transfer jig, fixture analog. The provisional coronal restoration has been placed for illustrative purpose.

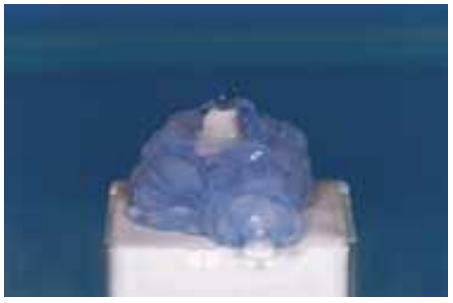


**Figure 9.** Clear polyvinyl-siloxane has be captured the subgingival part of the abutment.

days after second-stage surgery, depending on logistics and team preference. With the cast made at fixture placement, the restorative team has a few months available to fabricate the temporary reconstruction before it will be placed by the surgeon as a functional temporary unit at second-stage surgery. Time is of the essence when the impression is taken shortly after the second-stage surgery, however, since the temporary assembly needs to be placed within a few days to guide the healing in mature soft tissue.

2. A titanium temporary cylinder is treated to establish a bonding surface for the composite. Surface treatment may consist of Silicoating and opaqueing (Heraeus Kulzer, Inc., Irvine, Calif.).[12,13] Plastic temporary cylinders are available, but they lack dependable chemical bonding capability with composite and are more difficult to positively reposition onto the oral fixture head.

3. The custom cylinder is placed on the laboratory fixture analog of the cast, and bonding agent is applied to it. A matrix of the wax-up is fabricated, and a screwdriver capable of engaging the laboratory screw in the temporary cylinder is positioned (**Figure 2**). In the matrix, only the coronal part is filled with composite (Triad, Dentsply International, York, Penn.) after which it is placed on the cast. This assembly is positioned in a light-curing oven (Triad 2000, Dentsply International) for two minutes (**Figure 3**). After removal from the cast, the cylinder is connected to a laboratory fixture analog, and the cementoenamel junction is identified. At this moment, one can appreciate the volume needed to create the underlying "root form." Additional composite is placed to ensure a gradual transition from the fixture level to the tooth structure. Adequate support is needed for the tissue but it should not infringe on the minimal volume needed to maintain blood flow and healthy tissue. A surface sealing composite (Palaseal, Heraeus Kulzer, Inc., Irvine, Calif.) is placed to ensure a smooth, tissue-friendly surface.

4. The cementoenamel junction is identified and marked with pencil (**Figure 4**). The coronal part is now prepared with a diamond as if a standard crown preparation (**Figure 5**). The custom abutment is repositioned onto the cast, and a provisional crown is made to fit. The assembly is now ready for introduction into the oral environment.

5. Intraoral access to the fixture is established, and the provisional abutment is fitted (**Figure 6**). The contours should be modified as needed. The composite has adequate hardness so it is easily shaped with rotary diamonds or added to with light-cured composite material. The provisional coronal restoration is placed with a non-eugenol temporary cement.

6. Over the course of the following eight to 20 weeks, the site is re-evaluated and the abutment adjusted as needed to create adequate pressure for the papilla to form and the proper emergence profile to develop (**Figure 7**). Once the final tissue contour and consequential abutment form has been established, this information is transferred to the dental laboratory.

### *Indirect Transfer*

With the indirect transfer technique, fixture level impression copings are modified to mirror the gingival component of the provisional abutment. Fixture position and tissue contour are transferred simultaneously to the laboratory model.

1. The provisional abutment is removed from the fixture. At this time, the soft tissue is intimately adapted to the smooth composite surface, suggesting hemi-desmosomal attachment.

2. The abutment is transferred to a jig with a laboratory fixture analog (**Figure 8**). Clear polyvinyl siloxane (Memosil, Miles Inc., South Bend, Ind.), is injected around the subgingival part of the provisional abutment (**Figure 9**). Upon setting, the abutment is removed and replaced with a surface-treated fixture level impression coping. The Silicoated surface treatment will ensure a bond between the metal of the coping and the composite additive material.

3. Resin bonding material is applied to the Silicoated surface and a flowable composite (Revolution, Kerr Corp., Orange, Calif.) is carefully introduced between the coping and clear matrix. This assembly is light-cured in a light-curing oven for two minutes. After full polymerization, the impression coping is removed and a surface sealer applied (Palaseal, Heraeus Kulzer, Inc., Irvine, Calif.) to ensure a smooth subgingival surface (**Figure 10**).

4. The modified impression coping is placed intraorally onto the fixture (**Figure**

**Figure 10.** The customized impression coping. Note the exact replication of abutment contours.

**Figure 11.** Customized impression coping seated.

**Figure 12.** Birdseye view. Note the distinct circumferential shape.

**Figure 13.** Radiographic verification of positive seat of customized impression coping.

**Figure 14.** The embedded coping, showing the subgingival.

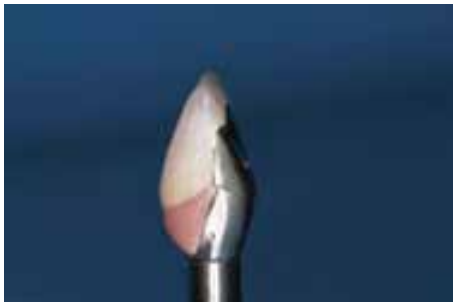


**Figure 15.** The custom abutment, with porcelain-fused-to-metal restoration.

**Figure 16.** Frontal view of provisional abutments. Multiple grafting procedures have preceded this stage after patient endured grave facial trauma.

**Figure 17.** Lingual view of provisional abutments, with access channels still obturated.

**Figure 18.** Access channels have been filled with reinforced polyether impression material and material is syringed around the external part of the provisional abutments.

**11 and 12**). At this time, some blanching may occur since the peri-implant soft-tissue may have collapsed without the support from the provisional abutment. A radiograph is made to ensure correct seating onto the fixture (**Figure 13**). A polyvinyl siloxane impression material (Monophase, G.C. America, Alsip, Ill.) is utilized with a standard open tray. After setting, the impression is removed, leaving the pick-up impression coping embedded in the impression (**Figure 14**).

5. A soft tissue and die stone cast is fabricated in the usual manner, replicating the exact fixture position and peri-implant soft-tissue contours.

6. The final abutment and crown are fabricated (**Figure 15**).

### *Direct Transfer*

With direct transfer, the actual provisional abutments are utilized to transfer the peri-implant soft-tissue contours and the position of the fixture.

**Figure 19.** Internal aspect of provisional abutment impression, depicting shape of coronal part of provisional abutments.

**Figure 20.** Frontal view after removal of provisional abutments. Even without support, the appearance of normal gingival contour and papillae is evident.

around the abutments and natural teeth (**Figure 19**), and the filled impression tray is seated.

2. Upon setting of the polyether impression material, the tray is removed and the impression inspected. After approval, the imprints of the screw head are removed with a round bur to ensure complete seating of the abutment during the next phase.

**Figure 21.** Close-up of customized provisional abutment. This distinct shape would be difficult to match with off-the-shelf products.

**Figure 22.** Laboratory fixture analogs are connected to the provisional abutments, and the assembly is repositioned into the impression. Polyvinyl-siloxane model material is injected into this impression.

**Figure 23.** AOcclusal view of the custom abutments in the newly acquired model.

**Figure 24.** Provisional abutments removed. Note position of fixture heads in relation to contour of abutments.

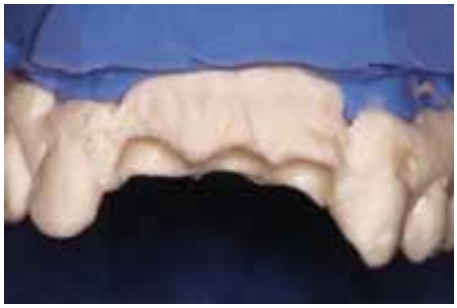


**Figure 25.** The intraorally created soft-tissue contours are exactly duplicated to the cast.

**Figure 26.** Final restoration upon cementation.

As with any transfer technique, care must be exercised because discrepancies can be introduced during each step.

1. The access sleeve to the screw of the provisional abutment (**Figure 16**) is cleaned. Piece(s) of metal wire 1.5 cm long are coated with a polyether adhesive and set aside. A polyether impression material (Permadyne, ESPE, Seefeld, Germany) is mixed and introduced with a needle tube syringe (Centrix Inc., Shelton, Conn.) into the access sleeve (**Figure 17**). The metal wire is introduced as a reinforcement into the impression material in the sleeve (**Figure 18**). The remainder of the impression material is carefully syringed

3. The provisional abutment is then removed from the oral fixture (Figures 20 and 21), and a laboratory fixture analog is attached to it (**Figure 22**). This assembly is carefully repositioned in the corresponding part of the polyether impression (**Figure 23**). With the pin of the sleeve and the distinct form of

the preparation, this assembly can be adequately secured.

4. A dedicated polyvinyl siloxane material (Model in a Minute, Roydent, Rochester Hills, Mich.) is injected into the impression, followed by the heavy body base material. Because two chemically different materials are used, no bonding will occur, and the cast may be removed from the impression one minute after application of the material. This type of cast is rigid enough for manipulation but has the flexibility of a soft-tissue cast. The fast set allows the clinician to reposition the provisional abutments in a timely manner, which is important because the soft tissue will have a tendency to collapse.

5. The laboratory screws of the provisional abutments are loosened and the abutments removed from the cast (**Figure 24**). The cast is a replication of the fixture position and the peri-implant soft tissue (**Figure 25**) and is ready for fabrication of the mirrored final abutments and crowns. The provisional abutments are repositioned intraorally, and the provisional crowns recemented (**Figure 2**6).

## Summary

A combination technique is described to fabricate provisional healing abutments and transfer the individualized peri-implant soft-tissue contours to the dental laboratory. This technique will allow the practitioner to deliver highly customized implant care, while utilizing familiar techniques and readily available materials.

### References

1. Branemark P-I, Zarb GA, Albrektsson T, Tissue-Integrated Prostheses: Osseointegration in Clinical Dentistry. Quintessence, Chicago, 1985.
2. Daftary F, Dentoalveolar morphology: evaluation of natural root form versus cylindrical implant fixtures. Pract Periodontics Aesthet Dent 9(4):469-77, 1997.
3. Chee W, Donovan T, Use of provisional restorations to enhance soft-tissue contours for implant restorations. Compend Contin Educ Dent 19(5):481-9, 1998.
4. Potashnick S, Soft tissue modeling for the esthetic single-tooth implant restoration. J Esthet Dent 10(3):121-31, 1998.
5. Pissis P, Emergence profile considerations of implant abutments. Pract Periodontics Aesthet Dent 6(7):69-76, 1994.
6. Biggs W, Placement of a custom implant provisional restoration at the second-stage surgery for improved gingival management; a clinical report. J Prosthet Dent 75(3):231-3, 1996.
7. Bichacho N, Landsberg C, Single implant restorations: prosthetically induced soft tissue topography. Pract Periodontics Aesthet Dent 9(7):745-52, 1997.
8. Touati B, Custom-guided tissue healing for improved aesthetics in implant-supported restorations. Int *J Dent* Symp 3(1):36-9, 1995.
9. Stein J, Nevins M, The relationship of the guided gingival frame to the provisional crown for a single-implant restoration. Compend Contin Educ Dent 17(12):1175-82, 1996.
10. Chee WL, Cho GC, Ha S, Replicating soft tissue contours on working casts for implant restorations. J Prosthod 6:218-220, 1997.
11. Hocwald DA, Surgical template impression during stage I surgery for fabrication of a provisional restoration to be placed at stage II surgery. J Prosthet Dent 6:796-8, 1991.
12. Laufer B-Z, Nicholls JI, Townsend JD, SiOx-C coating: a composite-to-metal bonding mechanism. J Prosthet Dent 60:320-7, 1988.
13. Caeg C, Leinfelder KF, et al, Effectiveness of a method used in bonding resins to metal. J Prosthet Dent 64:37-41, 1990.
To request a printed copy of this article, please contact/ Lambert J. Stumpel, III, DDS, 450 Sutter St., Suite 2314, San Francisco, CA 94108.

CDA JOURNAL, VOL 28, Nº4

# And God Said, Let There Be Gold

Robert E. Horseman, DDS

We bow to no one in our admiration for science and our appreciation for all the benefits the scientific community has bestowed on us. This goes all the way back to Marconi, Farraday and Atwater Kent, whose genius culminated in our being able to enjoy today the spectacle of three talk show participants with opposing views exchanging spirited spittle-enhanced opinions all at the same time on a 60-inch TV screen.

In our own profession, scientific research has lifted us from treadle-operated handpieces that only lasted as long as the operator's calf muscles held out, to high-speed, turbine-driven instruments that survive as many as six sterilization cycles.

Thanks to the efforts of dedicated scientists, practitioners have the option of addressing faulty occlusal grooves with a $40,000 laser, an $8,000 air abrasion unit or a $2 disposable diamond. The choice of restorative materials is so diverse and in so many colors that G.V. Black would have wept for joy.

With the most recent development of an ergonomically designed toothbrush handle and the universal acceptance of the Bend-a-Brush, it becomes apparent that science has probably taken us about as far as we can go. Any further progress in the field of dentistry will most likely come from people with MBA degrees.

At least that was my feeling until just the other day when a feature story in the Los Angeles Times headlined "Struck by 'Golden Miracles'" convinced me that we are on the cusp of a whole new era in dentistry fueled by a Higher Authority.

Read on: Orangevale, CA -- "In the heart of the Sacramento Valley, where 49ers flocked to mine a mother lode of riches 150 years ago, Christian believers are proclaiming a new and godly gold rush: The Holy Spirit, they claim, is miraculously transforming porcelain crowns and silver fillings into gold."

Divine dentistry is apparently taking up the Torch of Alchemy and running with it, if you can believe Pastor Rich Oliver at the Family Christian Center. He is only one of an estimated 500 million charismatic and Pentecostal believers worldwide who make up Christianity's fastest-growing segment according to the Times article.

A recent CBS-TV poll reported that nearly 80 percent of Americans believe in miracles, even in today's scientific environment. This would explain the public's purchase of lottery tickets when the odds of winning are 500 trillion to one. These are the same people who believe a parking place in an upscale mall the week before Christmas will open for them. There is a fine line between faith and a belief in miracles. In the past few decades, we may have not lost faith but transferred it from God to the medical profession. If so, there are signs of a reversal.

Among certain churches whose mem-

bers stress ecstatic expression in terms of miracles, healings and prophetic intuition, "gold teeth have become the latest and flashiest form of supernatural phenomena attesting to God's power." In Pastor Oliver's Orangevale congregation, one Jan Rosenberg said God had changed her amalgam to gold to bolster her spirits after a deep bout of depression.

The report does not mention whether the gold came in the form of a crown that was affixed with heavenly cement nor will Ms. Rosenberg's own dentist confirm that the event actually happened.

Despite a gathering storm of silver-to-gold claims among believers, Michael Shermer, president of the Skeptics Society (motto: You've got to be out of your mind!) summarily dismisses them as a "classic urban legend." He says, "Of all the things going on -- cancer, war, disease -- God is busy changing fillings? That's the best He can do?"

We, as dentists, must keep an open mind here. Pooh-poohing the existence of miracles may not be in our best interests. If the sporting world can embrace a Dennis Rodman and people keep buying Kenny G albums, miracles are hard to deny. Our concerns are more practical. For example:

* If we place a three-surface amalgam and, before we can submit a claim to the insurance company, some prayer-intensive activity changes the restoration to a full gold crown, can we claim for that instead without inviting a scrutiny of our records by authorities? Is there a lab bill involved here?

- Or, say, we cement six anterior PFMs and, while standing back to admire our esthetic handiwork, Divine Intervention zaps them into six gold crowns. What then?
- Will pre-authorization forms bypass insurance companies altogether in favor of church approval?
- If a dentist places an amalgam and by dint of transmogrification it changes to gold and fails within five years, exactly who is liable for replacement here? Or is failure not an option in this case?

Seems to me we are going to have to alert our patients to the potential problems of just willy-nilly requesting celestial upgrades without reference to procedure codes.

In the meanwhile, dental circles are anxiously awaiting any concrete evidence that a three-unit bridge has manifested itself in one of the faithful. This may change everything.