

OF THE CALIFORNIA DENTAL ASSOCIATION

Journal

SEPTEMBER 2007

Endodontic Instrumentation

Dental Anatomical Anomalies

Impressions and Working Casts

Children's Oral Health

DISPARITIES IN

& ACCESS TO CARE





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FEATURES

619 DISPARITIES IN CHILDREN'S ORAL HEALTH AND ACCESS TO CARE

This paper provides an overview of oral health disparities experienced by racial and ethnic minority children based upon the socioeconomic status. Many Americans, particularly children, continue to suffer disproportionately from oral pain and disease, including minority, low-income, and/or special care populations.

Lesa Paige Bentley, MHA, MBA, MBIT

625 SIMPLIFYING ENDODONTICS WITH ENDOSEQUENCE ROTARY INSTRUMENTATION

Recent advances in endodontic instrumentation have simplified the treatment process and improved long-term success. Ten years ago, the vast majority of endodontic instrumentation was being performed with hand files and reamers. Today, most practitioners providing endodontic therapy are utilizing rotary instrumentation.

Gregori M. Kurtzman, DDS, MAGD

631 DENTAL ANATOMICAL ANOMALIES IN ASIANS AND PACIFIC ISLANDERS

Dental anatomical anomalies having a significant impact on endodontic diagnosis and treatment are the talon cusp, tuberculated premolars, three-rooted mandibular molars, and C-shaped molars. Asian and Pacific Islander ethnic groups have the highest percentage of these dental anatomical anomalies compared with the general population. As the population of Asians and Pacific Islanders continues to grow in California and other western states, dentists should be aware of the diagnostic and treatment complexities associated with specific patient groups.

Charles E. Jerome, DDS, and Robert J. Hanlon, Jr., DMD

637 IMPROVING DECISION-MAKING IN RESTORATIONS: EVALUATION OF IMPRESSIONS AND WORKING CASTS

This report looks at the finish line consistency of 73 "clinically acceptable" impressions made by dental students and working casts poured in the laboratory section. Findings show a number of possible inaccuracies in preparations, impressions, or a combination of both.

Gitta Radjaepour, DDS

Health Care Reform — A Quixotic Quagmire

ALAN L. FELSENFELD, DDS

This is the year of health care reform for California. Maybe this is the year of health care reform.

The problem, simply stated, and, admittedly, it is an oversimplification, is a significant segment of our population does not have the ability to receive routine health care. At least three bills and three proposals are before the state Legislature at this time to allegedly solve this problem. All of them provide the ability for the uninsured and underinsured to receive medical care as needed. A Kaiser Commission study suggests that only 20 percent of our state population is not eligible for some form of coverage.¹ This may not include the undocumented immigrants, those who are eligible for coverage by safety net programs but do not participate, and those who have coverage but no access to care.

The diverse programs and proposals include a single payer model (a statewide program for universal health care funded and administered by the government) as well as a mandate for employers to “pay or play” (provide insurance to employees or put money into a state purchasing pool). The Medi-Cal program is not likely to be improved, but Healthy Families, a federally funded State Children’s Health Insurance Program, eligibility criteria may be increased to 300 percent of the poverty level. Most of the proposals, with one exception, do not mandate dentistry as part of the program other than to include



The surgeon general stated that oral health care is an integral part of total health care, and dentistry has championed that opinion.

dental care as an optional benefit for individuals to purchase through the state purchasing pool. This might be considered favorable by many of our members for financial reasons, but there is growing public concern about the all inclusiveness of any health care package.

Universal health care presents problems for dentistry. Dentists take pride in being health care professionals and espousing total patient care. Conversely, many of us have been frustrated with insurance companies and public programs that limit access to care, as we define it, and reimburse at less than fair market value for services rendered. This causes confusion and unhappiness in our patients as well as frustration with the system for patient and provider. This conflict between payers, patients, and providers has implications in health care reform with universal coverage regardless of the plan.

The surgeon general stated that oral health care is an integral part of total health care, and dentistry has championed that opinion. The periodontal literature is replete with articles support-

ing theories that poor periodontal health is related in a causative manner to many systemic illnesses. Maintaining periodontal health is essential to prevention and control of significant problems such as heart disease, stroke, diabetes, and low birth weight babies. Recent discoveries of salivary markers for systemic malignancies have improved dentist involvement in saving lives by simple, noninvasive testing. Management of drug effects, as in the use of antihypertensive or antiseizure medications creating periodontal disease, or bisphosphonates and osteonecrosis have integrated dentistry into the treatment of serious medical conditions. Truly, dentists are achieving the conceptual goal of becoming physicians of the oral cavity.

Insurance reimbursement and coverage for procedures has spiraled downward over the years. This trend is not likely to be reversed absent governmental intervention. But government programs are not necessarily any more user friendly, and reimbursements are equally poor for services provided. Most of us do not desire socialized or government health care coverage for dentistry since the remuneration is likely to be significantly

lower and the administrative process will be convoluted with impressive impact on the bottom line of running practices with increasingly high overhead. Some practitioners may be able to opt out of the system and not accept any third-party reimbursement, but that is not a reasonable position for many of our colleagues.

It is reasonable to believe that a negotiated health care program will be put into place, if not this year then in the future. Dentistry has to take a position on inclusion of dental care benefits in any plan that will be enacted. We need to be at the table to be certain that quality oral health care is allowed for all Californians. Dentistry has much to offer in the prevention, detection, and management of oral and systemic diseases. Our patients need the ability to receive care. We need to ascertain that coverage will allow, at a minimum, prevention and treatment of acute problems to relieve pain and treat infections. Children should be the first area of concern in any dental program. Inclusion of dentistry in a health care package will not be comfortable for many of our colleagues, but we are doctors and need to take responsibility for health care in our patients both at the local level in our practices and globally for the greater good.

If dentistry is going to talk the talk, it has to be prepared to walk the walk, and that may be very uncomfortable for many of us. ■■■■

REFERENCES

1. The Uninsured: A Primer — Key Facts about Americans Without Health Insurance; The Kaiser Commission on Medicaid and the Uninsured, December 2003.

Address comments, letters, and questions to the editor at alan.felsenfeld@cda.org.



Dan Hubig

Puffing and Snoozing Top the List of Lifestyle Factors That Impact Oral Health

A study has identified that certain lifestyle habits have an impact on periodontal health. Among these factors are mental stress, exercise and nutrition, but the top two are smoking and sleeping.

A study in the spring issue of the *Journal of Periodontology* followed a group of 219 factory workers in Japan from 1999 to 2003 in an effort to evaluate the effect of different lifestyle factors on the progression of periodontal diseases. Each worker was evaluated on a list of the following lifestyle factors: alcohol consumption, eating breakfast, hours of sleep, hours worked, mental stress, nutritional balance, physical exercise, and tobacco use. At the top of these factors that impacted the progression of periodontal disease was smoking, trailed by hours of sleep.

More than 41 percent of study partici-

CONTINUES ON 610

The woman had told her dentist that, fearful of losing her teeth, she brushed with a hard-bristle toothbrush for more than 30 minutes three times a day.



Helping Patients Give Overbrushing the Brush Off

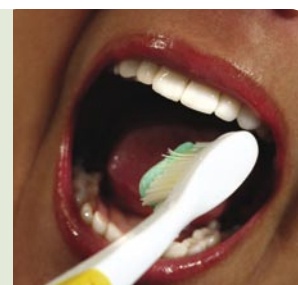
There is something to the adage "too much of a good thing." It even applies to dental care.

In an article in the *Texas Dental Journal*, Drs. Hiroyasu Endo, Terry Rees, William Hallmon, Yoshiharu Kono, and Takao Kato, reported on a number of case studies showing that "excessive oral hygiene practices" can inflict serious gingival injuries.

One of the cases presented was of a 54-year-old woman with a one-month history of gingival problems, including bleeding and lesions. The woman had told her dentist that, fearful of losing her teeth, she brushed with a hard-bristle toothbrush for more than 30 minutes three times a day. Her dentist instructed her to use a soft-bristle brush and limit her brushing to two minutes each time. Two weeks later, the patient reported she was no longer in pain, and the dentist noted that all ulcers and other problems had disappeared.

In another case, a woman who reported similar personal hygiene habits also stated she had sore gums. After receiving brushing tips from her dentist, the patient reported a week later that her gingival pain had disappeared completely.

The authors concluded by warning that excessive brushing and other bad habits could be a sign of emotional disturbance.



Researchers already have taken the first steps to separately grow the crowns and roots of teeth from adult stem cells.

Museum Features Cutting-edge Science That Could Treat Disease and Grow New Teeth

For thousands of years humankind has sought to replace lost teeth. Even ancient Egyptians used gold wire to attach a donor tooth to their own teeth. Now, imagine replacing a missing tooth with a new one grown from one's own cells? What's more, imagining may not be too far from becoming an actuality.

At the Samuel D. Harris National Museum of Dentistry, the recently opened exhibit "Bioengineering: Making a New You" shows how researchers have taken the first steps to grow new teeth from adult stem cells. One also can discover how this emerging science works, what it means for the future of dentistry, and what types of careers could help make it a reality. The cutting-edge dental research that is being

done could revolutionize the way a lost or diseased tooth is treated, but could also offer the key to diagnosing and treating systemic disease.

Engaging displays and hands-on experiments reveal the science behind the breakthroughs, "Bioengineering: Making a New You," which opened June 16, traces the history of tooth replacement from

the ancient Egyptians to today; explores how researchers are using adult stem cells (found in the pulp of baby teeth and adult teeth) to begin growing natural teeth replacements; and reveals how genes inserted into the salivary glands could be used to treat systemic disorders like diabetes.

"Bioengineering: Making a New You" showcases innovative research that could ultimately change the face of oral health and the treatment of systemic disease," said Rosemary Fetter, NMD executive director. "The National Museum of Dentistry is proud to play a part in educating the public about these important advances in dentistry that will make a significant



← Stem cells obtained from pig periodontal ligament form a single colony cluster. A stimulus has caused these cells to organize — an example of the first step toward growing a new tooth.

impact on our lives in years to come."

The completion of the Human Genome Project has enabled scientists to unlock the secrets of the genetic code, opening the door to unprecedented breakthroughs in science. Researchers already have taken the first steps to separately grow the crowns and roots of teeth from adult stem cells. They are working on growing a complete tooth with the correct shape and size. Researchers also are studying ways to treat oral and systemic diseases using genes. Salivary glands are being studied as an ideal injection site for gene therapeutics.

"Bioengineering: Making a New You" is the latest installment of "Your Spitting Image" series, the first museum exhibition to focus on the cutting-edge research that is changing the face of dentistry. Developed by The Dr. Samuel D. Harris National Museum of Dentistry, the interactive three-part exhibition includes "Saliva: A Remarkable Fluid"; "Forensics: Solving Mysteries"; and the current "Bioengineering: Making a New You." The series explores how emerging science will affect dentistry and overall well-being in the future.



↑ Mankind has sought to replace missing teeth for thousands of years. Ancient Egyptians had access to "specialists of the teeth."

Some had their teeth replaced by using gold wire to attach the crown from a donor tooth to their own teeth.



↑ Careers in cellular and molecular biology, chemistry, genetics engineering, and dentistry will help help make bionengineered teeth a reality.

Perio Therapy May Help Baby Arrive Right on Time

According to a study published recently in the *Journal of Periodontology*, periodontal therapy may significantly reduce the risk of delivering a preterm, low birth weight baby for women with the oral disease.

The study looked at 328 pregnant women with periodontal disease and 122 periodontally healthy women. Periodontal treatment was performed during the second trimester of pregnancy on 266 of the women with periodontal disease. Sixty-two women dropped out of treatment. Postpartum follow-up on all 450 subjects showed that 79 percent of the women with untreated periodontal disease had delivered a preterm, low birth weight baby compared to only 7.5 percent of the periodontally treated women and 4.1 percent of the healthy women.

“Our study showed that performing periodontal therapy on pregnant women who have periodontal disease may reduce

the risk of preterm delivery to equal that of periodontally healthy women,” said study author Catia M. Gazolla, DDS. “These are important findings that we hope all pregnant women will take to their dental professionals when discussing their periodontal health.”

“These findings are interesting, as they come on the heels of another study appearing in the May issue of the *JOP* that showed the effects of high levels of periodontal bacteria during pregnancy on increased risk for preterm delivery,” said Preston D. Miller, Jr., DDS, president of the American Academy of Periodontology. “These studies and others continue to strengthen the idea that women should consider a periodontal evaluation as part of their prenatal care.”



Some Straightforward Steps in Preparing to Sell

Preparing a dental practice for sale involves a number of phases, said financial expert Timothy Brown in an issue of *Ontario Dentist*. Brown said there are five main steps one should consider before attempting to successfully sell a practice:

- Confirm your premise lease renewal. Although most leases contain an option to renew, a tenant must confirm the presence of such an option before selling or risk a lot of headaches later on. Most practice buyers today demand the right to remain in the existing premises for a minimum of seven or eight years.
- Prepare your financial records. Buyers want to understand the nature of a practice and may want to see a procedure analysis to determine if their skill set matches that of the owner vis-à-vis the financial software used in the practice.
- Ensure that your practice is protected against employee fraud. It might be wise to hire a professional fraud investigator to go over your books and computer data to shore up your practice. A clean bill of health in this area is nice to have prior to selling.
- Review and update contracts and agreements. Purchasers demand accurate details of the contracts you have in place. Ask your associates, partners, and landlord for copies of your contracts and make sure they are dated and signed.
- Consult with your accountant about incorporation. There might be substantial tax benefits to incorporating prior to a sale.



Be Proactive Before Catastrophe Strikes

Preparation is key in helping a dental practice survive a natural or man-made disaster said property-loss expert Wes Baldwin in an issue of *NYSDA News*, the newsletter of the New York State Dental Association.

And, Baldwin wrote, the time to plan for disaster is now because one can't file a claim for what one cannot prove one owned. It is essential one complete an inventory, and document every aspect of your practice, including its contents. Other considerations, according to Baldwin:

- If you own the building in which your practice is located, keep photos of the exterior on file.
- Photograph the interior of your

practice, including all of its equipment and supplies. Don't forget storage areas.

- Keep a record of serial numbers and replacement value for all your equipment.
- Make copies of all contracts and financial records in order to determine losses caused by a disaster.
- Back up patient records, X-rays, and computer files.

All of these materials, along with insurance policies, equipment manuals, warranties, and deeds should be secured off site.

Baldwin also advised hiring a public insurance adjuster after disaster strikes. Paid a percentage of the final settlement from the insurance company, a public adjuster tends to be less biased in arriving at a final settlement.

Honors

Kevin D. Anderson, DDS, MAGD, of San Diego, was recently honored with the 2007 Distinguished Service Award from the Academy of General Dentistry. As former treasurer, chair of Budget & Finance, as well as the Investment Committee, Anderson provided valuable input in the establishment of goals and strategic direction to help grow and establish financial stability for the AGD. In two years he grew the reserves of the Academy from \$2.2 million to more than \$6.5 million.

Anderson retired from the active practice of dentistry five years ago and recently launched a private equity partnership fund open to accredited investors of which many dentists are partners.

This year's winner of the Norton M. Ross Award for Excellence in Clinical Research is **John D. B. Featherstone, MSc, PhD**, professor and interim Dean of the University of California, San Francisco, School of Dentistry, Preventive and



Kevin D. Anderson, DDS, MAGD



John B. Featherstone, MSc, PhD



Arthur A. Dugoni, DDS, MDS

Restorative Dental Sciences.

The award recognized him for his "perseverance in investigating the field of cariology," as well as his groundbreaking research that "has significantly advanced scientific knowledge of dental caries and caries-inhibitory mechanisms, and changed the way we treat caries and control the underlying infectious disease," according to an ADA press release.

The Program Advisory Committee of the Edward B. Shils Entrepreneurial Education Fund presented its 2007 Shils Award to **Arthur A. Dugoni, DDS, MDS**, dean emeritus of University of the Pacific, Arthur A. Dugoni School

of Dentistry. Dugoni was honored for his outstanding leadership and exemplary service to the dental community, dental education, and public oral health.

Dugoni is currently president of the ADA Foundation and has served as president of the ADA, the American Association of Dental Schools, the American Board of Orthodontics, and the California Dental Association. While he concluded his deanship at the Arthur A. Dugoni School of Dentistry in 2006, he continues to be involved with the school and the university as dean emeritus, professor of orthodontics, and senior executive for development.

UPCOMING MEETINGS

2007

Sept. 27-30 American Dental Association 148th Annual Session, San Francisco, ada.org.

Nov. 27-Dec. 1 American Academy of Oral and Maxillofacial Radiology 58th Annual Session, Chicago, aaomr.org.

2008

May 1-4 CDA Spring Scientific Session, Anaheim, 800-CDA-SMILE (232-7645), cda.org.

Sept. 12-14 CDA Fall Scientific Session, San Francisco, 800-CDA-SMILE (232-7645), cda.org.

Oct. 16-19 American Dental Association 149th Annual Session, San Antonio, Texas, ada.org.

To have an event included on this list of nonprofit association continuing education meetings, please send the information to Upcoming Meetings, CDA Journal, 1201 K St., 16th Floor, Sacramento, CA 95814 or fax the information to 916-554-5962.

"Entrepreneurship is living a few years of your life like most people won't, so that you can spend the rest of your life like most people can't."

ASPIRING BUSINESS OWNER,
AS QUOTED IN
ENTREPRENEUR MAGAZINE

ADA Publication Reviews Impression Materials, High-speed Handpieces

Working time for elastomeric impression materials can drop 50 percent or more once syringed around the teeth and reach mouth temperature, according to the summer issue of the *ADA Professional Product Review*.

"We knew that the reaction time was shorter at higher temperatures, but we were surprised some materials retained only 25 percent of their working time at 35-degrees Celsius compared with working time at 23 degrees," says David Sarrett, DMD, editor of *PPR*. "For some materials, the working time at 35-degrees Celsius was less than 10 seconds."

In addition to working time, the *PPR* reported on elastic recovery, stiffness, tear strength, and other common properties. Brands of impression materials tested for this review were Affinis, Aquasil Ultra Smart Wetting, Correct Plus, Examix NDS, Flexitime, Genie Ultra Hydrophilic, Impregum Penta Soft Quick Step, Imprint 3, Take 1, and VP Mix.

PPR, which was packaged with the July issue of *The Journal of the American Dental Association*, also looked at high-speed handpieces, both air turbine and electric.

This edition also featured performance

evaluations of eight air turbine handpieces and compared traits of those handpieces with their electric counterparts. Handpiece manufacturers whose products were reviewed were Bien-Air, Brasseler, Dental-EZ Group, Dentsply, KaVo, and Sirona Dental Systems.

PPR is a quarterly publication sent to ADA dentists along with their issue of *The Journal of the American Dental Association*. The newsletter is free to ADA members and available by subscription to nonmembers. For subscription information, go to www.ada.org or call 312-440-7735.



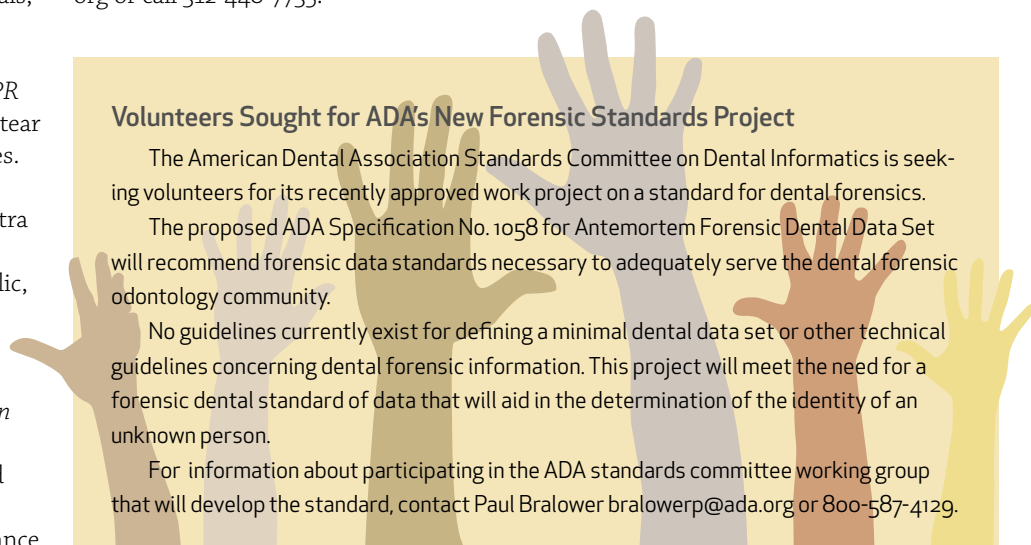
Volunteers Sought for ADA's New Forensic Standards Project

The American Dental Association Standards Committee on Dental Informatics is seeking volunteers for its recently approved work project on a standard for dental forensics.

The proposed ADA Specification No. 1058 for Antemortem Forensic Dental Data Set will recommend forensic data standards necessary to adequately serve the dental forensic odontology community.

No guidelines currently exist for defining a minimal dental data set or other technical guidelines concerning dental forensic information. This project will meet the need for a forensic dental standard of data that will aid in the determination of the identity of an unknown person.

For information about participating in the ADA standards committee working group that will develop the standard, contact Paul Bralower bralowerp@ada.org or 800-587-4129.



"This study points out to patients that there are lifestyle factors other than brushing and flossing that may affect their oral health."

PRESTON D. MILLER, JR., DDS



DENTIST, CONTINUED FROM 605

pants who showed periodontal disease progression from 1999 to 2003 were smokers. Additionally, lack of sleep was identified as a significant lifestyle factor that may play a role in the progression of periodontal disease. The participants who snoozed seven to eight hours exhibited less periodontal disease progression than those who received six hours or less of sleep. Daily alcohol consumption and high stress levels also demonstrated significant impacts on periodontal disease progression.

"Our findings are in line with other studies that have identified smoking as a strong lifestyle factor affecting oral health," said study author Muneo Tanaka, DDS. "However, studies that have looked at hours of sleep as an independent factor affect-

ing periodontal health are limited. From this study, we can speculate that shortage of sleep can impair the body's immune response, which may lead to the progression of diseases such as periodontal disease."

"This study points out to patients that there are lifestyle factors other than brushing and flossing that may affect their oral health," added Preston D. Miller, Jr., DDS, president of the American Academy of Periodontology. "Simple lifestyle changes, such as getting more sleep, may help patients improve or protect their oral health," said Miller. "It is also important to keep these in mind as the body of evidence linking oral disease with systemic diseases continues to grow because ultimately these lifestyle factors might impact a patient's overall health."



Winners of the 2007 Table Clinic Competition

Each year, the California Dental Association invites dental, dental hygiene and dental assisting students and military residents from across the state to enter the Table Clinic Competition at the Anaheim Scientific Session. The first-place finishers in each category receive cash awards and an invitation to write an abstract of their work to appear in the *Journal of the California Dental Association*.

SCIENTIFIC STUDENT WINNERS

The CDA Foundation awarded a \$1,000 scholarship to the recent winners of the Dental Assisting Student Table Clinic Competition. Supporting promising students is crucial to developing a competent work force and, therefore, the CDA Foundation is committed to sponsoring this scholarship. Ultradent Products, Inc., was the sponsor of the table clinics. Following are the winners of the 2007 table clinic competition.

Photos by Charr Crail

An online application for the 2008 Table Clinic competition will be available Oct. 1 at cda.org.



Dr. Ron Mead, CDA president, and Judy Durrant of Ultradent Products flank a beaming University of Southern California dental student George Abichaker, winner in the scientific category of the annual table clinics competition held during the 2007 Spring Session in Anaheim.

Cytomegalovirus-induced Embryopathology: Mouse Submandibular Salivary Gland Epithelial-Mesenchymal Ontogeny as a Model

Michael Melnick, George Abichaker, Tina Jaskoll, University of Southern California School of Dentistry; Edward S. Mocarski, Stanford University School of Medicine

PURPOSE: Human studies suggest, and mouse models clearly demonstrate, that cytomegalovirus, CMV, is dysmorphic to early organ and tissue development. CMV has a particular tropism for embryonic salivary gland and other head mesenchyme. CMV has evolved to co-opt cell signaling networks so to optimize

replication and survival, to the detriment of infected tissues. It has been postulated that mesenchymal infection is the critical step in disrupting organogenesis. If so, organogenesis dependent on epithelial-mesenchymal interactions would be particularly vulnerable. In this study, we chose to model the vulnerability by investigating the cell and molecular pathogenesis of CMV infected mouse embryonic submandibular salivary glands, SMGs.

METHODS: We infected E15 SMG explants with mouse CMV (mCMV) for 24 hours and cultured them in the presence or absence of active infection for up to 12 days.

RESULTS: We infected E15 SMG explants with mouse CMV (mCMV). Active infection for up to 12 days in vitro resulted in a remarkable cell and molecular pathology characterized by atypical ductal epithelial hyperplasia, apparent epitheliomesenchymal transformation, oncocytic-like stromal metaplasia, β -catenin nuclear localization, and upregulation of Nfkb2, Relb, Il6, Stat3, and Cox2. Rescue with an antiviral nucleoside analogue indicated that mCMV replication is necessary to initiate and maintain SMG dysmorphogenesis.

CONCLUSION: mCMV infection of embryonic mouse explants resulted in

dysplasia, metaplasia, and, possibly, anaplasia. The molecular pathogenesis appeared to center around the activation of canonical and, perhaps more importantly, noncanonical NF κ B. Further, COX-2 and IL-6 are important downstream effectors of embryopathology. At the cellular level, there appeared to be a consequential interplay between the

transformed SMG cells and the surrounding extracellular matrix, resulting in the nuclear translocation of β -catenin. From these studies, a tentative framework has emerged within which additional studies may be planned and performed.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE

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CLINICAL STUDENT WINNERS



Loma Linda University dental students Audrey Mojica and Natalie Cochran graciously accept their first-place award for the clinical category. They are joined by Judy Durrant and Dr. Ron Mead.

Treatment of Common Oral Conditions

Natalie Cochran, Audrey Mojica, Loma Linda University School of Dentistry

ABSTRACT: Common oral conditions are often diagnosed but left untreated due to confusion and uncertainty about proper treatment. The purpose of our project was to provide a concise and informative reference guide covering treatment options of common oral conditions for students and dental professionals.

MATERIALS AND METHODS: Using clinical photos, courtesy of Dr. Susan Richards, and an Apple Computer with iPhoto software, we created a reference guide in an iPhoto book format. The book was published by Apple, as well as published online in pdf format through our school's

education Web site (Blackboard). Pre- and post-tests were given on Blackboard to the Loma Linda University School of Dentistry dental class of 2008. The post-test was only made available after the student had studied the online reference guide.

RESULTS: A paired-t test at a significance level of $\alpha=0.05$ showed that the post-test performance was significantly higher than the pretest, with $p < 0.0001$. The median pretest score was 6 out of 10, and the median post-test score was 8. The percentage of students whose scores improved was 71.7 percent.

CONCLUSION: Our reference guide, *Treatment of Common Oral Conditions*, assisted students in accessing pertinent treatment information, producing a statistically significant improvement in their test performance.

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CONTACT Natalie Cochran at ncochran@llu.edu or Audrey Mojica at amojica@llu.edu.

RDA STUDENT WINNERS

Do You Want Your Child to Have a Brighter Smile and a Brighter Future? It All Begins at Birth!

Yun Hee Chung, Sandra P. Ayala,
Whitney V. Iosua, Olivia Bugarin, Ha-
cienda La Puente Adult Education

PURPOSE: The purpose of this presentation is to increase the awareness of bacterial transmission from mothers to infants. As dental assistants, we have a responsibility to educate patients about the transfer of their saliva to their babies.

MATERIALS AND METHODS: We gathered various articles and literature from the *Journal of the California Dental Association* and pediatric dentistry journals. We discussed how the bacteria are transferred from mothers to their babies. Also, we discussed how we can prevent and improve through patient education. We spoke to pregnant women and mothers of infants from the class and explained to them how they could transmit bacteria to their babies. They realized the damage this action created and they wanted to correct their behaviors. In addition, we suggested seeing their dentist during the pregnancy to start antibacterial salivary treatment earlier so they can prevent bacterial transmission. We produced an exemplary clinical brochure that has brief information on treatments and explanation of bacterial transmission. The mothers thought it was informative and useful. There are three ways of treatment for mothers with high level of mutans streptococci: fluoride varnish, chlorhexadine mouthrinse, and xylitol. Considering cost, time, and patient compliance, we thought chewing gum containing xylitol has the most potential. We ran a mini-experiment to see the effectiveness of chewing gums that contained xylitol.

EXPERIMENT: We prepared xylitol extract from xylitol gum; 6g of xylitol was extracted to 20 ml of sterile saline water. A colony of saliva bacterial culture was

diluted to 9 ml of sterile saline water, and it was divided into three different test tubes: one was control, another was for three drops of xylitol, and the other was for six drops of xylitol. When a bacterial culture was mixed with six drops of xylitol extract, it showed significant inhibition of bacterial growth compared to three drops of xylitol extract grown at the same period of time. The result indicated that when a proper amount of xylitol is consumed, recommended 6~10g of xylitol per day, xylitol helps to prevent the bacterial transmission from mothers to infants.

CONCLUSION: Dental caries is an infectious and transmissible disease that is caused by bacteria, mutans streptococci. However, not many mothers and soon-to-be mothers are aware of this information. We emphasized how important it is to educate all mothers. We, as dental assistants, need to inform our patients about available treatments so they can prevent transferring bacteria to their babies.

SUGGESTION: We felt there is a lack of communication between the medical and dental professional. We would like to promote that the medical and dental professionals work together in the future for the benefit of the patient, including the combination of the diagnostic process becoming a team effort.

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CONTACT Yun Hee Chung at withdear@hotmail.



Drs. Anthony Perez and Bruce Toy (far left and far right) take a moment with RDA student winners Sandra P. Ayala, Olivia Bugarin, Yun Hee Chung, and Whitney V. Iosua of Hacienda La Puente Adult Education.

RDH STUDENT WINNERS



Jamie Davidson (far left) and Candace Barclay (holding blue ribbon) of Cypress College are all smiles with Judy Durrant and Dr. Ron Mead after the announcement that the students had won in their category.

Probing Into Manufacturers' Differences

Jamie Davidson and Candace Barclay, Cypress College

BACKGROUND: To determine the calibration and manufacturers' differences of manual probes.

METHODS: Six variations of periodontal probes were obtained from different manufacturers. Probes shared the 3, 6, 9, 12 design. A single blind study was conducted, N=24. First molars were probed then re-probed after 30 minutes. Random selection of the probes allowed

for a complete comparison of all probes against each manufacturer to determine differences. The amount of pressure was standardized with a less than 2 percent variation between examiners. Data was analyzed using a Winks statistic software program. Probes were measured for variations in size and weight.

RESULTS: Data analysis determined differences from manufacturer to manufacturer were not statistically significant; however, individual comparisons determined slight variances in readings from manufacturer to manufacturer.

CONCLUSION: Results of the study determined a difference exists between manufacturers of periodontal probes. Data supported the need for a standardized probe for dentistry, millimeters are crucial in disease assessment and progression.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT Jamie Davidson, P.O. Box 1658, La Mirada, Calif, 90637.

MILITARY PEER-VOTE WINNERS



Vinh T. Ton, DDS, is shown with his winning entry, "Immediate Loaded Implants," in the military peer-voting category.

(There was a three-way tie in the peer-voting competition; however, only one abstract was provided to the *Journal*.)

Immediate Loaded Implants

Vinh T. Ton, DDS, LT, DC, United States Navy

BACKGROUND: As dental implants become the standard of care, there has been a tremendous increase in implant treatment. Two-stage surgical implant or delayed loaded implant, DLI, protocol for "loaded free and submerged healing" was designed to maximize predictability of osseointegration. However, discomfort, inconvenience, and anxiety related to healing time associated with this technique, DLI continues to be a challenge for both the patient and the clinician. Single-stage or immediate-loaded implant, ILI, protocol is designed to reduce the steps

and length of treatment time and ultimately eliminate some of these challenges.

PURPOSES: The purpose of this table clinic was to review the success rate of ILI versus DLI, and discuss the surgical, implant, host, and occlusion-related factors that may influence outcome of ILI treatment modality.

MATERIAL AND METHODS: Review of the literature was limited to human studies over the past 25 years. Data was organized in a table format to demonstrate the differences between the success rates of ILI versus DLI, and address factors that have a significant impact on implant success; especially important in ILI treatment.

RESULTS: The success rate of ILI is clinically and statistically similar to those found in DLI. Regardless of implant type, surface coating, and design, ILI has similarity success rate when com-

pared to DLI. Bone quality, quantity, and bone morphology of bone to implant contact postosseointegration are found to be similar in both ILI and DLI.

CONCLUSION: This review of the literature supports the use of the ILI technique due to similar clinical and statistical success rates between ILI and DLI. Bone and quantity around ILI are found to be similar to those found in DLI. No significant clinical difference of crestal bone loss between ILI and DLI were noted. Solid initial stability of implants is considered to be the most important criteria for achieving ILI success. A meticulous case selection is necessary to integrate ILI treatment modality into daily practice. Importantly, surgical, host, occlusion, and implant-related factors should be carefully studied and analyzed prior to starting treatment.

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Socket Preservation: An Overview of the Indications, Benefits and Techniques of Preserving Alveolar Bone After Tooth Extraction

Alfonso Navarrete, DDS, and Matthew Burke, DDS, Veterans Administration Northern California Health Care System, general practice residency, Mare Island, Calif.

OBJECTIVES: A review of the general principles, techniques, materials, and indications for socket preservation after tooth extraction.

METHODS: A literature review was conducted and specialists were consulted.

RESULTS: Tooth extraction may result in alveolar ridge resorption or collapse. As part of the informed consent process, it is important that the potential sequella to the surgical procedure be thoroughly reviewed with the patient. As part of this discussion, socket preservation with

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the goal of preserving bone volume for future treatment should be considered. There is a 25 percent decrease in width of alveolar bone in the first year and a 40 percent to 60 percent decrease in

Drs. Gary Ackerman, far left, and Dennis Shinbori, far right, congratulate Drs. Matthew Burke and Alfonso Navarrete for their first-place table clinic.

TABLE 1

Grafting Materials

	Osteogenesis	Osteoinductive	Osteoconductive
Autograft	Yes	Yes	Yes
Allograft	No	Yes/No	Yes
Xenograft	No	No	Yes
Alloplast	No	No	Yes

width in two to three years' postextraction.²⁻⁵ After multiple extractions, there is a 4 mm decrease in height of alveolar bone.^{4,5} This bone loss experienced after tooth extraction can have undesirable esthetic, hygienic, and prosthetic results.

Due to potential undesirable results postextraction, patients should be educated about the indications for pocket preservation. Indications include, but are not limited to 1) prevention of or reduction of bone resorption postextraction; 2) preservation of bone contour and volume; 3) provide adequate bone for future implant placement; 4) maintain soft tissue esthetics; and 5) help with the maintenance of the adjacent tooth periodontal status.

Extraction site management includes atraumatic tooth extraction, asepsis, removal of all granulation tissue, evaluation of remaining bony walls, ensuring adequate blood supply, choosing the appropriate grafting materials, soft tissue closure, and allowing for adequate healing time.¹

The decision to utilize grafting material presents many choices to the clinician. Autografts are taken from the patient's own body, either from extraoral or intraoral harvest sites. Allografts are obtained from members of the same species (TABLE 1).

Xenografts are from a different species such as porcine or bovine. Alloplasts are synthetic materials such as ceramics or bioglass.

Graft selection criteria should include the following: biologic availability, predictability, clinical feasibility, minimal operative hazards, minimal postoperative sequelae, and patient acceptance.

Graft potential varies depending on

the material used and is critical for the clinician to understand. Ideal characteristics of graft material are its ability to form bone and induce bone formation. Osteogenesis is the formation of new bone by cells contained in the graft. Osteoinduction is a biochemical process by which molecules contained in the graft convert the neighboring cells into osteoblasts. Osteoconduction is the physical effect by which the matrix of the graft forms a scaffold that favors outside cells to penetrate the graft and form new bone.

CONCLUSION: Key factors for success include proper diagnosis, treatment planning, careful extraction technique, utilizing the appropriate materials and methods for the patient and postoperative follow-up. When extractions are being considered, patients should be given the appropriate information to make an informed decision and part of this would be to present the possibility of socket preservation to minimize potential bone loss and optimize the area for future treatment.

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Disparities in Children's Oral Health and Access to Care

LESA PAIGE BENTLEY, MHA, MBA, MBIT

ABSTRACT The oral health of Americans has improved in recent years, yet considerable gaps in the provision of dental care remain according to the *U.S. Surgeon General's Report* in 2000. This paper provides an overview of oral health disparities experienced by racial and ethnic minority children based upon the socioeconomic status. Many Americans, particularly children, continue to suffer disproportionately from oral pain and disease, including minority, low-income, and/or special care populations.

AUTHOR

Lesa Paige Bentley, MHA, MBA, MBIT, is a dental compliance manager for Aetna, Inc., managing the western dental territory for all regulatory matters.

The oral health of Americans has improved in recent years, yet considerable gaps in the provision of dental care remain, according to the *U.S. Surgeon General's Report* in 2000.¹ The report states that oral health is essential to the general health and well-being of all Americans. There is a silent epidemic of oral diseases affecting our most vulnerable citizens: poor children, the elderly, and many members of racial and ethnic minority groups. The report served as a wake-up call against this silence and a call to action for health professionals, policymakers, community leaders, insurance companies, the public and private business.

During the 2004-2005 school year, the Dental Health Foundation surveyed more than 21,000 California children in kindergarten or third grade in nearly 200 randomly selected schools located across the state.² They found that by the third grade, more than 70 percent of the children had a history of tooth decay; at any given moment, more than a quar-

ter of the children had untreated tooth decay; and some 4 percent of the kids were sitting in the classroom in pain or suffering from an abscess. The problem is worse for the poor, Hispanics, other ethnic minorities, and for the uninsured. Barriers to dental care, including parental financial difficulties or a lack of dental insurance, can have a profound impact on their children's dental health. About one-third of low-income children have untreated decay compared to about one-fifth of higher income children.

Oral diseases are cumulative and progressive over time and can affect lives in many ways. Oral diseases can limit the foods one eats, affects one's appearance, and cause significant pain and discomfort. Oral health is also an integral part of overall health and may lead to systemic diseases. One such disease, periodontal disease, is caused by bacterial growth that forms dental plaque. When plaque is not completely removed on a daily basis, calculus forms and causes the symptoms associated with periodontal disease.

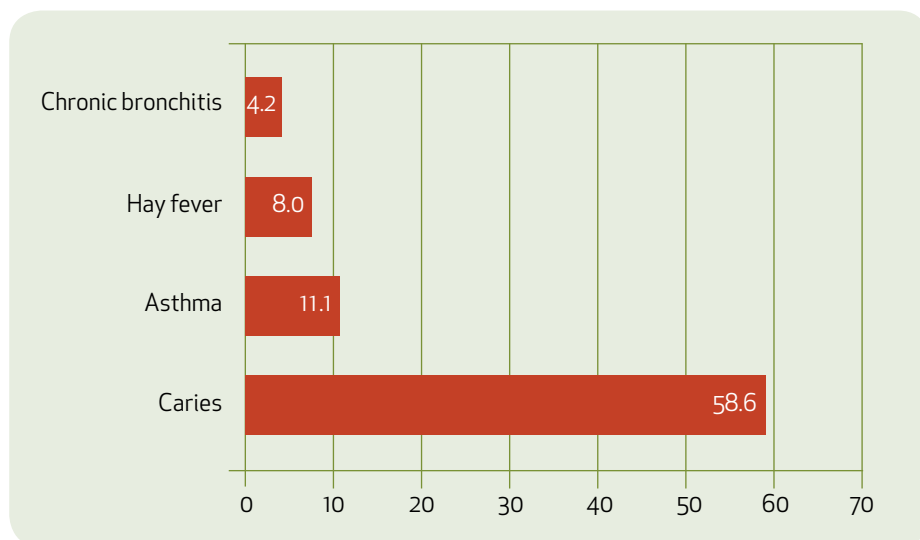


FIGURE 1. Dental caries 5-to 17-years-old.

Note: Data from the National Center for Health Statistics, 1996.

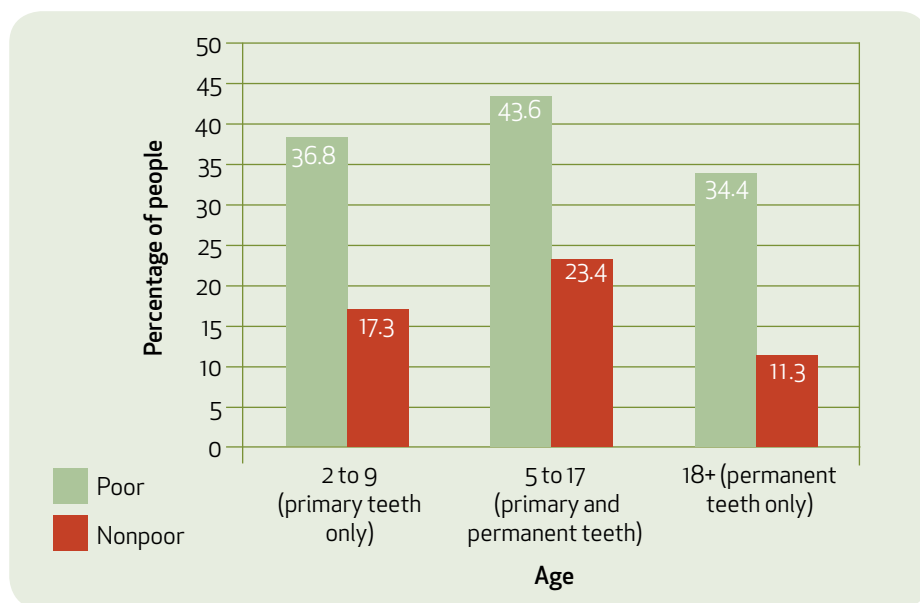


FIGURE 2. Higher percentage of poor people untreated decayed tooth.

Note: Data from the National Center for Health Statistics, 1996.

Periodontal bacteria may enter the bloodstream to affect major organs and to stimulate new infections. Recent studies have shown a relationship between periodontal disease and low birth weight babies.

Vulnerabilities to oral health may be due to a variety of reasons including poor nutritional habits, inadequate oral hygiene, or difficulties with accessing dental care. Oral disease is not only

common among adults, but children are also at high risk for oral health problems. Dental caries by far is the most common chronic childhood disease – five times more common than asthma and seven times more common than hay fever in children 5- to 17-years-old (**FIGURE 1**). Children suffering from oral health complications may be dealing with persistent pain and/or abscesses,

embarrassment of the appearance of flawed teeth, difficulty chewing or eating comfortably, and may be hindered from participating fully in typical childhood activities. Prevalence increases with age. The majority (51.6 percent) of children age 5 to 9 had at least one carious lesion or filling in a primary or a permanent tooth.³

Despite progress in reducing dental caries, individuals in families living below the poverty level experience more dental decay than those who are better off economically. Furthermore, the caries seen in these individuals is more likely to be untreated than caries in those living above the poverty level (**FIGURE 2**); more than one-third (36.8 percent) of poor children age 2 to 9 have one or more untreated decayed primary teeth compared to 17.3 percent of nonpoor children.

In addition to poverty levels, the proportion of teeth affected by dental caries also varies by age and race or ethnicity. Poor Mexican-American children age 2 to 9 have the highest number of primary teeth affected by dental caries (a mean of 2.4 decayed or filled teeth) compared to poor non-Hispanic blacks (mean 1.5) and non-Hispanic whites (mean 1.9). Among the nonpoor, Mexican-American 2- to 9-year-olds have the highest number of affected teeth (mean 1.8), followed by non-Hispanic blacks (mean 1.3) and non-Hispanic whites (mean 1.0).

There are also differences by race/ethnicity and poverty level in the proportion of untreated decayed teeth for all age groups. Poor Mexican-American children age 2 to 9 have the highest proportion of untreated decayed teeth (70.5 percent), followed by poor non-Hispanic black children (67.4 percent) (**FIGURE 3**). Nonpoor children have lower proportions of untreated decayed teeth, although the group with the lowest proportion (non-Hispanic whites) still has an average of 37.3 percent of decayed teeth untreated.

As it becomes more common knowledge that oral health is an inseparable part of general health, increasing emphasis is being placed on addressing the issues contributing to the poor oral health status of the nation.⁴ According to the 2001-2002 *Report Card* released by the collaborative effort of Oral Health America, the United States received a national grade of C for its status of oral health overall (TABLE 1). The report shows that policymakers need to place more emphasis on basic oral health across the nation. Similarly, California received an overall grade of C.

In addition, California was scored for availability of dentists, prevention programs, dental restorations, and presence of a dental director. The availability of dentists, for which California received a C, showed a very high ratio of 1:1,501-2000. This grade for the availability of dentists is based on the ratio of professionally active, licensed dentists to the state's population. Prevention, for which California received an F, is based on the percentage of population in each state on public water supplies receiving fluoridated water. The presence of a dental director, for which California received an F, is due to a lack of an individual in this position and of an oral health coalition in the state.

In an effort to improve the health of all Americans, in 1979, a national initiative was established that emphasized coordinated and comprehensive activities in health prevention. The foundation of this effort was the *Oral Health in America: A Report of the Surgeon General* in 2000, *Healthy People and Healthy People 2000: National Health Promotion and Disease Prevention Objectives*, which resulted from the collaboration of government, voluntary, and professional organizations, businesses, and individuals. This report established a set of overall health objectives for the nation. Three major goals were established for the 1990s:

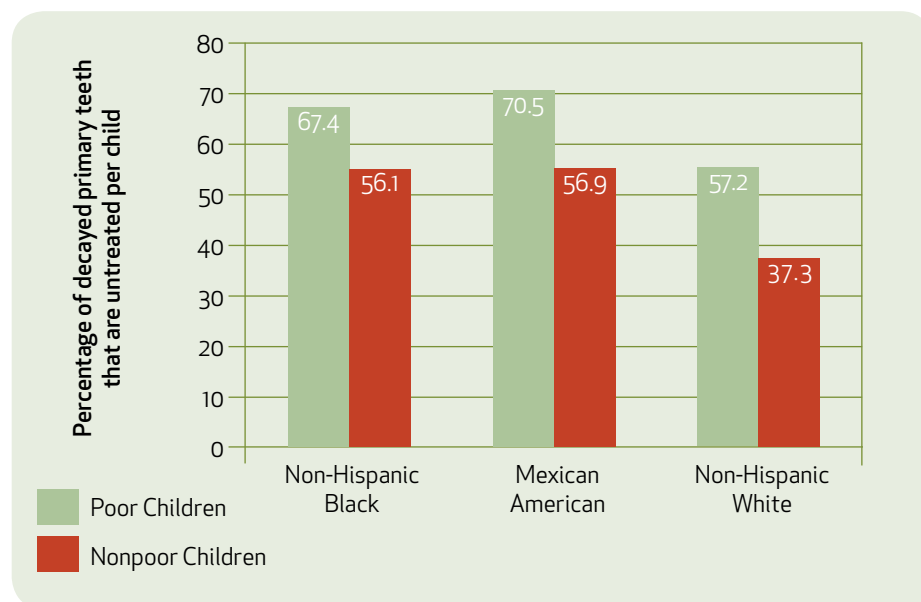


FIGURE 3. Poor children untreated decayed primary teeth.
Note: Data from the National Center for Health Statistics, 1996.

- To increase the quantity of healthy living,
- To reduce health disparities among Americans, and
- To ensure access to preventive services for the whole population.

In a broad sense, the term health disparities refer to differences that exist among population subgroups and their ability to access and receive quality health care. The National Institutes of Health has defined health disparities as differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific populations groups in the United States. Disparities are commonly observed among ethnic groups. Minorities and persons living in rural communities suffer from higher mortality rates from cancer, heart disease, and diabetes than whites, and are less likely to receive diagnostic tests and treatments.

Two decades after the *Healthy People and Healthy People 2000* report was announced, the surgeon general issued a call to action specifically to address oral health care needs and disparities within the U.S. population. Concurrently, the U.S. Department of Health and Human Services,

Healthy People 2010 initiative, established goals for the current decade. The primary goals of Healthy People 2010 are to increase quality and years of healthy life, and eliminate health disparities.

Recommendations

Accordingly, the Dental Health Foundation recommends that a means to improve the socioeconomic status of children in oral health and access to care in California would be to develop a comprehensive oral health surveillance system, eliminate barriers to care, prevent disease, and establish an integrated public health infrastructure.

DEVELOP A COMPREHENSIVE ORAL HEALTH SURVEILLANCE SYSTEM. At this time, California lacks any mechanism to regularly and systematically collect data on the oral health status of individuals or the availability of oral health services. Decision-makers must have current and reliable information to establish relevant policies and programs and evaluate their success. California needs a system to regularly assess oral health status and services. Such a system would require local county assessments of the oral health status, needs, and available resources for care for chil-

State Final Grades 2001–2002

Data from the *Oral Health America*, 2001.

dren in preschool through high school to be conducted every five years. In addition, statewide assessment of oral health status of preschool and school-aged children needs to be conducted every five years.

ELIMINATE BARRIERS TO CARE. People fail to receive good oral health care for a number of reasons including: a lack of resources (insurance or money) available for care; limited appreciation for the importance of oral health; and little information about publicly funded programs. In addition, reimbursement rates for providers through California's public dental insurance programs are significantly lower than most states and insufficient to attract any significant participation by most private providers. Expand programs to inform Medi-Cal, Healthy Families and Children's Health Initiative enrollees about their dental benefits and the importance of early and periodic dental visits to prevent oral disease. Provide financial incentives to medical and dental professionals to provide early preventive care, including counseling, risk assessment, and preventive dental procedures. Increase payments for preventive services to providers who receive training on early childhood oral health.

PREVENT DISEASE. Dental decay is largely preventable if appropriate preventive measures are taken at an early age. These measures include early care by a dentist. Proven preventive dental services such as dental sealants, fluoride varnishes, and the fluoridation of community water supplies are effective but are underutilized. Funding for research aimed at preventing or eliminating the disease is limited. Every child should have a dental examination and necessary treatment by kindergarten. Require all dental insurance and managed care plans to provide coverage for dental sealants and other scientifically proven preventive

measures. Increase, to at least 25 percent, the number of preschool children served by existing programs that receive fluoride varnish applications and other preventive services. Increase funding for state prevention programs to add more schools, more grades, special education programs, and to provide more resources for local preventive programs and expansion of preschool preventive activities. Fund dental sealant programs and other preventive services in existing school-based/school-linked programs, and develop new preventive programs at community clinics and migrant health centers. Conduct a seal promotion campaign directed at both the public and dental professionals. Increase financial support for capital, operations, and maintenance costs of community water fluoridation. Build the science base by encouraging more research aimed at prevention and elimination of the disease.

ESTABLISH AN INTEGRATED PUBLIC HEALTH INFRASTRUCTURE. California lacks a sufficient public health infrastructure to meet the oral health needs of its residents, including an adequate dental workforce focused on serving the public. This requires California to create and maintain a state dental director position. Provide adequate authority and resources to enable the director to advance policies and programs that improve oral health status while integrating oral health to overall health. Grow the public dental health.

Conclusion

Despite progress, large gaps remain. However, many Americans, particularly children, continue to suffer disproportionately from oral pain and disease, including minority, low-income, and/or special care populations. A growing number of children are also facing difficulties in accessing care, as states cut Medicaid dental benefits. Community health

centers and public health facilities alone are able to provide a sufficient safety net as a majority of dentists do not participate in Medicaid. Children who come from low-income families are the ones who are suffering from poor oral health and inadequate access to care as a result of their socioeconomic status. The public, policymakers, and medical providers consider oral health to be less important than other health needs. Barriers continue to exist for children, dental disease is still prevalent in the United States, and we have fewer dentists graduating from dental school to provide essential preventive and restorative services. In order to reverse these trends, we need to mobilize resources, including public and private oral health care providers. ■■■■

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Simplifying Endodontics With EndoSequence Rotary Instrumentation

GREGORI M. KURTZMAN, DDS, MAGD

ABSTRACT Recent advances in endodontic instrumentation have simplified the treatment process and improved long-term success. Ten years ago the vast majority of endodontic instrumentation was being performed with hand files and reamers. Today, most practitioners providing endodontic therapy are utilizing rotary instrumentation.

AUTHOR

Gregori M. Kurtzman, DDS, MAGD, is in private general practice in Silver Spring, Md., and is a former assistant clinical professor at the University of Maryland School, Baltimore College of Dental Surgery, Department of Endodontics, Prosthetics and Operative Dentistry. He earned diplomat status in the International Congress of Oral Implantologists.

DISCLOSURE

Dr. Kurtzman has been provided honoraria for lecturing on EndoSequence and has participated in funded research on Resilon/Epiphany.

Rotary instruments have allowed the instrumentation process to become easier and more productive. The introduction of greater taper instruments has allowed the practitioner to “mill” the canals thereby creating shapes that are easier to obturate. As a result of improved technology, file breakage has decreased and cutting efficiency has increased along with improvements in file flexibility.

Rotary NiTi Endodontic Files

In contrast to stainless steel hand files, nickel titanium endodontic files are not formed by twisting, but from grinding a blank. The design of the blank will influence a file's flexibility and how much lateral resistance is generated when the file is working within the canal. File designs that incorporate radial lands, in an attempt to reinforce the cross section of the file, and thereby decrease file separation (e.g., K3 file from Sybro-

nEndo), also significantly increase the percentage of contact within the canal wall and subsequently increase lateral resistance (**FIGURE 1**). The greater the file's lateral resistance, the greater the torque required to instrument the canal. Increasing the lateral resistance of a nickel titanium file will increase the torque requirement, making the file less efficient.

Radial lands that increase the stiffness of a file decrease its flexibility in curved canals. Files with essentially triangular cores (e.g., ProTaper file, Dentsply Tulsa) will have greater flexibility than those with wide radial lands (K3), but may transport the canal if they lack a centering device. Furthermore, those files with a constant pitch (e.g., Profile from Dentsply Tulsa) have a tendency to create “suck-down,” particularly in larger sizes. Suck-down refers to the tendency of the file to be pulled apically as it engages the canal walls. File manufacturers have incorporated variable pitch and variable helical angles in an attempt to reduce suck-down.

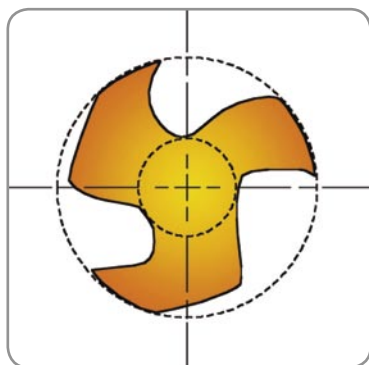


FIGURE 1. Graphic image demonstrating a file with lands and its contact with the canal walls.

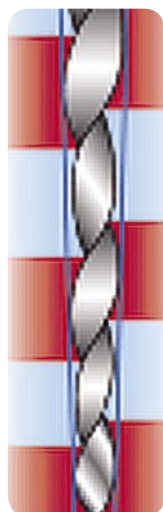


FIGURE 4. Graphical representation of alternating contact point between the file and canal.

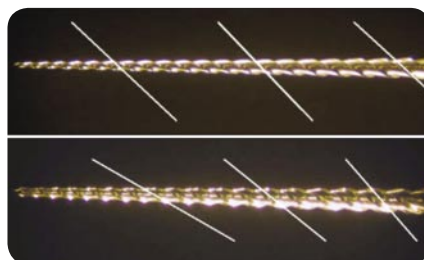


FIGURE 2. Comparison of a file with constant helical angle (top) and one with variable helical angle (bottom).

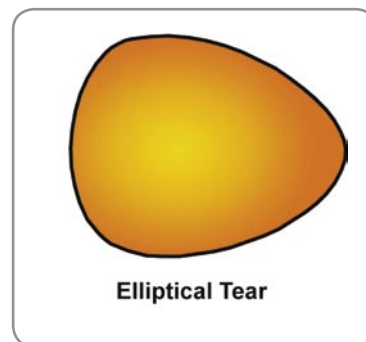


FIGURE 3. Graphic representation of an elliptical tear that may occur apically with a file that has a cutting tip.



FIGURE 5. SEM demonstrating the noncutting tip of the EndoSequence file.

Pitch is defined as the number of spirals or flutes per unit length on the file. The larger the number of spirals on a file, the greater the file's resistance. The lower the resistance, the more efficient the file and the smoother the instrumentation process. Consequently, a reamer design (triangular blank) will result in a more efficient cutting instrument.

As previously mentioned, a variable pitch file will decrease the tendency for suck-down, especially in files that are .06 taper or greater. Helical angles, defined as the angle where the flutes intersect the long axis of the file, determine debris removal as the file moves apically. Constant helical angles may lead to debris accumulation, which increases torque demand and can lead to file separation. Variable helical angles aid in moving de-

bris coronally out of the canal (**FIGURE 2**).

File tip design can be either cutting or noncutting. Cutting tips can lead to transportation of the canal in less experienced hands. Additionally, should a cutting tip pass through the apex an elliptical orifice may be created, making apical sealing more difficult (**FIGURE 3**). A noncutting tip is less aggressive and less likely to transport the canal. Should the noncutting tip be passed longer than the working length (through the apex) a round orifice is more likely created, which is easier to seal.

Rotary speed is dependent on the torque requirements of the file system. As the torque requirement is decreased, file speed can be increased. The greater the speed, the more efficient and the smoother the file works in the canal.

However, as file speed increases, there is a decrease in time to cyclic failure and consequently, the files cannot be used as many times before cyclic fatigue is encountered and instrument separation results. Files of any design run at low speed (150 rpm to 175 rpm) have an increased tendency for instrument separation. This results because the files efficiency is decreased and the practitioner tends to apply greater apical pressure to get the file to advance.

EndoSequence Files

The EndoSequence file (Real World Endo, Brasseler USA, Savannah, Ga.) addresses the concerns of previous file design by creating an efficient, safe file with a short learning curve that allows the practitioner to create well-instrumented (milled) canals.^{1,2}

The file design employed by the EndoSequence instrument provides for alternating contact points, ACP, along the instrument's cutting length (**FIGURE 4**). The use of ACP allows the file to remain centered in the canal, while simultaneously reducing the torque requirements. The lack of radial lands provide a sharper instrument as a result of a decreased thickness of metal, thereby providing a more flexible file. This is true even in the greater tapers. Combined with a precision tip, the alternating contact points provide an efficient instrument that will not transport the canal.

In addition to its unique ACP design,

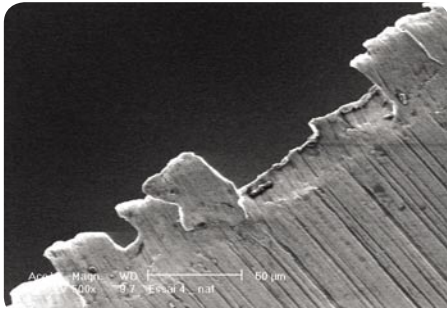


FIGURE 6a. SEM of file. Rough surface following grinding.

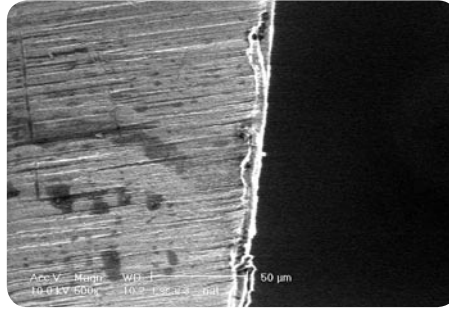


FIGURE 6b. Surface following traditional polishing.

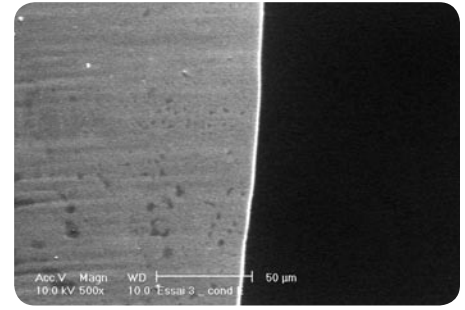


FIGURE 6c. Surface following electropolishing.

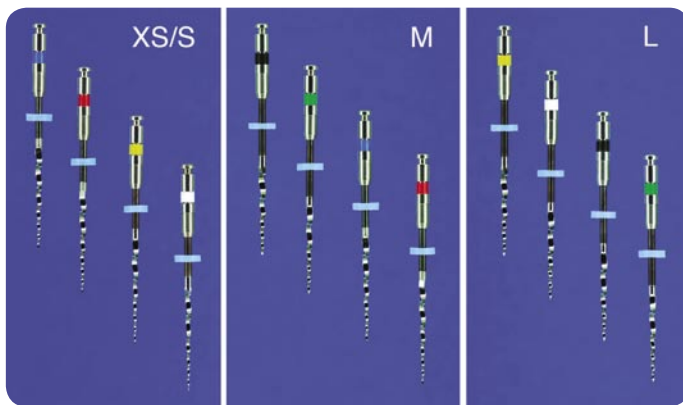


FIGURE 7. Representation of the file contents of the small, medium, and large EndoSequence file packs.



FIGURE 8. The EndoSequence Expeditor file.



FIGURE 9. Maxillary first premolar (No. 5) instrumented with a small EndoSequence pack. Final size for both buccal and lingual canals was a 30/.06.



FIGURE 10. Maxillary lateral incisor (No. 7) instrumented with a medium EndoSequence pack. Final size was a 40/.06.

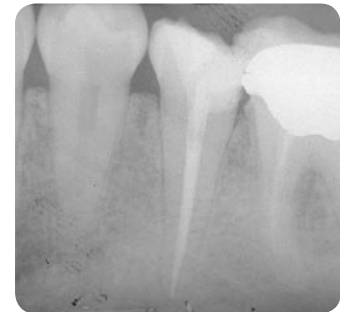


FIGURE 11. Mandibular second premolar (No. 20) instrumented with a large EndoSequence pack. Final size was 50/.06.

the EndoSequence file takes advantage of a precision tip. A precision tip is defined as a noncutting tip that becomes fully engaged 1 mm from the tip (D-1). (FIGURE 5). This design allows the instrument to be both safe and efficient.

Metal treatment has long been ignored in dental applications. Recent research has shown that the grinding process used in the fabrication of

nickel titanium endodontic instruments, leaves microcracks in the metal that may propagate into fractures when the instrument is subjected to stress (FIGURE 6a). Electropolishing removes the greatest majority of these microimperfections and produces a sharper instrument with increased cutting efficiency (FIGURES 6b, c). The EndoSequence file undergoes electropolishing and the result is visible in

its mirror-like finish that remains sharper longer and stays cleaner during use.

In addition to its use of ACPs and lack of radial lands, the EndoSequence file utilizes variable pitch and variable helical angles. As a result of these improved design features that reduce the torque requirements, an increased rate of speed (600 rpm) may be used with the EndoSequence file. The increased rate of speed

will result in greater tactile awareness. The ideal range for the EndoSequence file is between 500 rpm and 600 rpm. Should an audible clicking noise be heard during instrumentation, this is an indication too much apical pressure is being applied to the file and is not an indication of excessive revolutions per minute. This sound is common for files with a triangular cross section.

The EndoSequence file system is available in both .04 (size 15-60) and .06 (size 15-50) taper instruments, in lengths of 21, 25, and 31 mm instruments. It is also available in both single instrument packs and procedural packs (small,

medium, and large) (**FIGURE 7**). An initial rotary instrument called an "Expeditor" is included with the system to assist in determining the initial canal diameter and which EndoSequence package to open.

The Expeditor is a size-27 file, with a .04 taper and is 21 mm long (**FIGURE 8**). After coronal patency has been confirmed with a hand file, the Expeditor is introduced into the canal and taken to initial engagement. If engagement is met within the apical half of the Expeditor's cutting shank, the EndoSequence package opened will be a "small." Should the Expeditor advance to about the midway point before engagement is met, then a "medium" package is selected and the initial file used in a crown down manner will be a size 40. If the Expeditor does not meet any engagement, or is loose at full insertion, then a "large" package is utilized. The files are available in packs of individual sizes or as small (15-20-25-30); medium (25-30-35-40); and large (35-40-45-50) packs.

Precision instrumentation can be accomplished selecting which EndoSequence instrument pack is appropriate for that canal, based on the initial fit of the Expeditor. The canal is then enlarged using four sequential files, creating a shape to the canal that will allow thorough obturation (**FIGURES 9-11**).

Conclusion

Scientific advances in both file design and obturation materials have greatly improved the long-term success of endodontics. The EndoSequence file system has taken advantage of electropolishing, which has been used historically in both precision medical instruments, and in high-end machining. The result is a sharper, more efficient instrument. Lateral resistance is also decreased with the EndoSequence file by use of its unique alternating contact point design. Combined

with variable pitch and helical angles, the result is greater file control that helps achieve precision-based endodontics.

Endodontics has begun to take advantage of the scientific improvements touching other aspects of dental care. Precision-based instrumentation allows the practitioner to create constant tapered shapes making obturation easier and more predictable. Treatment predictability from precision-based instrumentation has allowed a leap forward in how we provide endodontic therapy. ■■■■

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Dental Anatomical Anomalies in Asians and Pacific Islanders

CHARLES E. JEROME, DDS, AND ROBERT J. HANLON, JR., DMD

ABSTRACT Dental anatomical anomalies having a significant impact on endodontic diagnosis and treatment are the talon cusp, tuberculated premolars, three-rooted mandibular molars, and C-shaped molars. Asian and Pacific Islander ethnic groups have the highest percentage of these dental anatomical anomalies compared to the general population. As the population of Asians and Pacific Islanders continues to grow in California and other western states, dentists should be aware of the diagnostic and treatment complexities associated with specific patient groups.

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All races and ethnic groups have some degree of dental anatomical variation. Groups that have the most varied dental anatomy and provide the most concern for the practice of endodontics are those of Asians and Pacific Islanders. The widest variation in coronal shape, external root form, and internal canal space morphology will be encountered with “Pacific Rim” cases.

Anthropological relationships among Western Coastal Native Americans compound the occurrence of anatomical variants in the Pacific Rim geographical area because Western Native Americans share virtually all anatomical anomalies with Asian populations.

According to March 2002 U.S. Census Bureau statistics, 12.5 million Asians and Pacific islanders lived in the United States. That 12.5 million represents 4.4 percent of the total U.S. popula-

tion. Fifty-one percent of that total population resides in the western United States that includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Asians account for 10.9 percent of California’s total population while native Hawaiian and other Pacific Islanders account for 0.3 percent of the population. The national Asian and Pacific Islander population is growing at a rate of approximately 4.5 percent per year.¹

Several different anatomical variations occur both externally on the tooth crown and within the root canal system. Examples of anomalies seen throughout all races and ethnic groups are dens invaginatus, dens evaginatus, shovel-shaped incisors, Cusps of Carabelli, taurodonts, multiple roots, and root form bifurcations. However, the most common anatomical variants associated with Asians and Pacific Island-



FIGURE 1. Central incisor talon cusp with developmental fissure caries.



FIGURE 2. Caries removal in the fissured area resulted in a near exposure of the pulp extension.



FIGURE 3. Dens evaginatus presenting as a projection of the lingual cusp.



FIGURE 4. Radiograph of Figure 3 demonstrating arrested root development from the exposed necrotic pulp.



FIGURE 5. Premolar example of a prominent tubercle arising from the central groove with nonvital pulp and arrested root development.

ers that will have an impact on diagnosis and treatment are talon cusps, three-rooted mandibular molars, C-shaped molars, and tuberculated premolars.

While some anomalies, such as dens invaginatus were described and reported in the 19th century, literature reports of some of the most common anatomical variants are surprisingly recent.² For example, C-shaped molars were first reported in the literature by Cooke and Cox in 1979.³

There are several reasons for studying dental anatomical variants in any population. The most significant reason, in clinical terms, concerns enhanced diagnosis and treatment planning. Establishing a diagnosis without a cause or etiology for a disease is risky and inappropriate. Inaccurate diagnosis quite often leads to improper treatment planning.

Some anatomical variants can cause pulpal or periradicular disease that does not have a very obvious cause. A prime example of this can be found with occurrences of apical pathosis associated with otherwise unrestored teeth. This

is most often seen in cases of maxillary lateral incisor dens invaginatus and maxillary and mandibular premolar dens evaginatus, also known as the tuberculated premolar. The etiology for pulpal disease may not be clinically apparent since many of these cases involve unrestored teeth and there is no evidence of crown fracture or history of trauma.

Recognizing anatomical variation prevents procedural errors. Treating mandibular molars without angled pretreatment radiographs can lead to missed third roots. The occurrence of three-rooted mandibular molars in Caucasians is only 1 percent to 4 percent compared to approximately 40 percent for some Pacific Rim populations.

Instrumenting the thin isthmuses found in C-shaped molars can lead to catastrophic strip-perforations. Instrumentation errors can be avoided by studying radiographic characteristics common to C-shaped molars. Referral for specialty care before procedural problems arise is an important aspect of proper treatment planning.

An often underestimated but important reason for studying anatomical variation is for forensic value. Two anatomical variations related to cusp morphology, that may not have diagnostic or endodontic implications but can be significant for forensic identification, are Cusps of Carabelli and shovel-shaped incisors.

The Cusps of Carabelli represents the cuspal tuberosity frequently observed on the lingual surface of maxillary molars while the shovel trait is seen as very prominent mesial and distal marginal ridges on maxillary incisors. Unlike the tuberculated premolar, Cusps of Carabelli do not contain a pulp horn extension into the cusp. Chinese populations differ from Western Europeans groups by having a high prevalence of the shovel trait on incisors and low presence of Carabelli's trait on molars.⁴

The following material is a review of characteristic anatomical variation that will be commonly found in the practice of Pacific Rim dentistry.

Talon Cusps

Histologically, the talon cusp and dens evaginatus are identical. The histology has been described by Lau as being an axial core defect of the dental germ. There is an extrusion of uncoordinated tissue proliferation into the stellate reticulum of the tooth germ during the bell stage of tooth development. This proliferation of tissue is followed by a preodontoblast layer of the dentin over which the enamel is subsequently built up. The cylinder of dentin and enamel contains a fine pulpal extension.^{5,6}

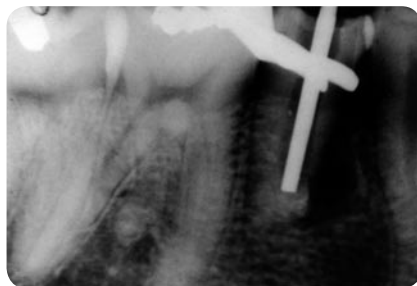


FIGURE 6. Radiographic verification of an MTA apical barrier. Note that the first molar has a third root proximal to the mesial and distal roots that appears very short.

The talon cusp occurs 90 percent of the time in the permanent dentition and infrequently in deciduous teeth. Talon cusps are present in overall populations with less than 1 percent frequency. Northern Indian and Malaysian groups, for example, have a high frequency of talon cusp occurrence.⁶

The talon cusp contains a pulp extension that has diagnostic and restorative clinical significance. The developmental fissures around the talon are subject to caries (**FIGURE 1**). Radiographically, the talon can mimic a superimposed mesiodens or a compound odontoma. Issues with talon cusps are primarily related to pulp exposure from normal occlusion attrition or pulp exposure from fissure caries (**FIGURE 2**). As with dens evaginatus, the pulpal extension inside the talon is subject to exposure from occlusal wear. Except for problems with fissure caries or possible occlusion interference, the talon cusp is not a very significant anomaly. From an endodontic treatment standpoint, the canal space has no unusual ramifications and will appear as a typical tubular canal space form.

Developmental fissures can be treated with minimally invasive restorations keeping in mind that the talon does contain a pulpal extension and is subject to exposure.

Dens Evaginatus

Dens evaginatus has also been described as the tuberculated premolar. Dens evaginatus occurs in approximately

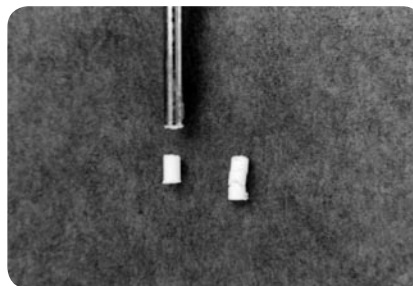


FIGURE 7. MTA plugs delivered by a micro-carrier.

2 percent of Asian populations and rarely in other ethnic groups. The highest percentages within the Asian groups were identified in Eskimo-Inuit, Filipino, and Thai populations.⁷ A higher incidence of dens evaginatus is observed in Eskimos-Inuits and Native North Americans, further evidence that there is an anthropological link between Native Americans and other Pacific Rim ethnic groups.⁸

This anomaly is responsible for most cases that have nonvital pulp in unrestored teeth. Nonvital pulp in tuberculated premolars frequently occurs at such a young age that apical root development is rarely completed. As pulp necrosis reaches apically to Hertwig's epithelial root sheath, further root growth will be arrested. Pulpal necrosis may occur, however, as late as the second decade.

The histologic-embryologic generation of dens evaginatus is the same as that for the talon cusp. However, in posterior teeth it is described as dens evaginatus. There is typically a bilateral distribution and a predilection for females. The evaginated pulp containing tubercle can be present on a cuspal inclination, in the center of the occlusal surface, or simply be an enlargement of the buccal or lingual cusp⁵ (**FIGURE 3**).

Pulpal necrosis ranges from 14 percent to 40 percent in all teeth with evaginated tubercles. The tubercle arises predominately from the lingual ridge of the buccal cusps. The location of the tubercle on the cuspal ridge makes it prone to occlusal wear in lateral excursive movement, resulting in exposure of the pulp projection within the extra cusp.



FIGURE 8. Obturation over barrier placement.

In another variant, the cusp arises as a tubercular projection from the center of the occlusal surface.^{8,9} The fragile enamel covering the cusp can be crushed during an occlusion episode even before it is exposed through normal wear. If recognized early, the cusp can be reinforced by placing bonded composite around it if it doesn't interfere with occlusion.¹⁰

When instrumenting canal spaces associated with dens evaginatus in premolars, special care must be taken to locate all radicular spaces. Mandibular premolars are known to have deep bifurcations that are not radiographically evident since the position of the bifurcation is buccolingual.

The most significant endodontic treatment challenge with dens evaginatus involves the apical management of incompletely formed roots. The tubercle is usually exposed from wear or crushed within a short time after the tooth is in occlusion resulting in necrotic pulp and incomplete root development (**FIGURES 4, 5**).

Open root apices can be managed with either apexification or placement of an artificial barrier. Many materials such as calcium hydroxide and tricalcium phosphate, both in paste and dry powder form, have been recommended for apexification.^{11,12} The disadvantage of using calcium hydroxide is the necessity for multiple visits, patient compliance, and long time periods required to complete the process of apexification.

A more contemporary technique employs the use of mineral trioxide aggregate, MTA, placed as a barrier. The procedure can be completed in two visits with obturation and immediate restora-



FIGURE 9. Three-rooted mandibular molar. Straight on view obscures the third root.



FIGURE 10. Angled radiographs separate the third root in the obturation view of the preop tooth in Figure 9.

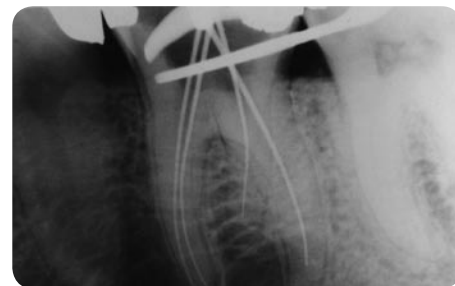


FIGURE 11. Instrument placement in a mandibular first molar. Because of the radiographic angulation, the third root appears very short. The third root curves back toward the buccal.



FIGURE 12. Buccal view of an extracted C-shaped mandibular second molar demonstrating the fusion groove. There are no coronal anomalies indicating unusual root form.



FIGURE 13. Mid- and apical sections of the tooth in Figure 12 showing that the root canal spaces are eccentric toward the fused groove. This is an example of a Melton Type I Continuous C-shape.

tion. At the first visit, the necrotic tissue is removed and the canal space soaked with sodium hypochlorite. Calcium hydroxide is then used as an intracanal medication for at least a week. At the second visit, MTA is placed to the apical extent of the undeveloped root and carefully packed as a barrier using radiographs to verify extent and completeness of the barrier (**FIGURES 6-8**). The entire canal can be obturated with MTA or traditional root canal obturation materials can be added over an apical barrier of MTA.¹³

Three-rooted Mandibular Molars

The incidence of three-rooted mandibular first molars in Caucasians ranges from 0.9 percent to 4.3 percent. There is great variation across Asian populations. Occurrence in Aleutian ethnic groups is reported as high as 43 percent, while neighboring Inuit populations are reported at approximately 12.5 percent. Japanese and Thai populations range from 19 percent to 20 percent with a comparative

low in Chinese population of 8 percent.¹⁴

The third root can present a diagnostic problem if multiple-angled radiographs are not exposed for endodontic treatment planning. The average diagnostic periapical film is usually exposed straight on rather than angled, and the third root is frequently superimposed and obscured by the distal root in this view (**FIGURES 9, 10**).

If there is wide separation of the roots and the third root comes off the root trunk at a 45-degree angle, the third root may appear radiographically very short and may be difficult to visualize (**FIGURES 9-11**).

The third root is lingual to the mesial and distal roots, and if not properly treated endodontically, it will present a challenge for possible apical surgery.

Third roots are anatomically separate and independent from the main distal root but the orifice location is always situated in closer proximity to the distal root orifice. This location is important for endodontic treatment. If a third root is

present, the operator may actually have to search for five orifices in total, mesio-buccal, mesiolingual, then the distobuccal, distolingual, and the orifice of the third root. The orifice of the third root may be relatively in the same location as the distobuccal and distolingual.

The apical extent of the third root frequently swings toward the buccal in the same manner that the apical third of a palatal root of a maxillary molar is inclined buccally. If the buccal curvature is not properly negotiated it can be easily ledged (**FIGURE 11**).

Since there is a high incidence of three-rooted mandibular molars, dens evaginatus, and C-shaped molars in Asian populations, these anomalies will frequently occur together. In Figures 6 and 8, note the presence of the three-rooted molar distal to the tooth being treated for dens evaginatus. The third root, radiographically proximal to the mesial and distal roots appears very foreshortened radiographically (**FIGURES 6, 8, 11**).

C-shaped Molars

The C-shaped root canal system anatomy is now well-recognized in the literature. As an anatomical anomaly, it is a relatively late bloomer as it was first reported by Cooke and Cox in 1979.

The C-shaped canal system occurs in mandibular first molars and maxillary molars but is most common in mandibular second molars. The incidence of C-shaped molars in the general population

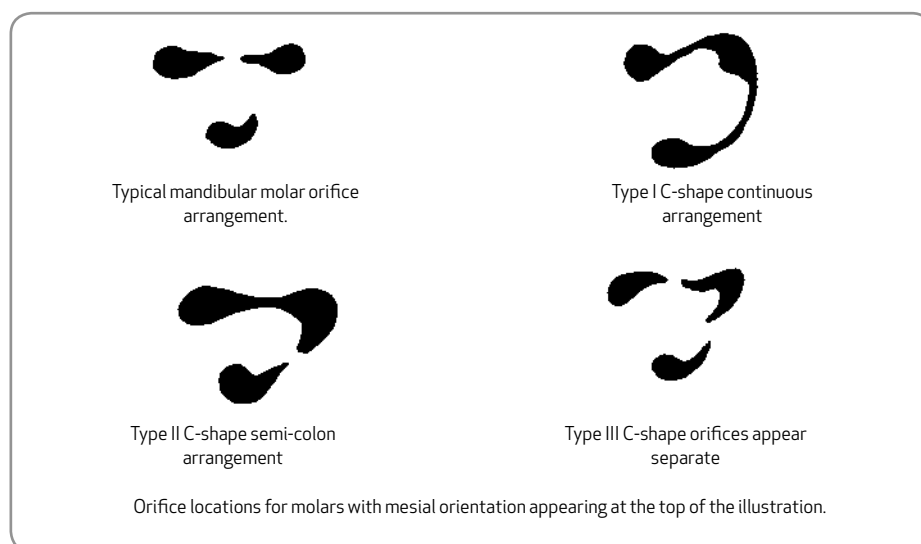


FIGURE 14. Orifice orientations for Melton's C-shaped molar classifications.



FIGURE 16. An extracted C-shaped mandibular first molar. The flat apical area is a clue to the presence of fused roots for this anatomical anomaly. Note the thin dentin isthmus connecting the main mesial and distal roots. The isthmus was perforated during instrumentation and obturation.



FIGURE 17. This mesially inclined mandibular second molar is C-shaped. The canal spaces are eccentric toward the furcation. That appearance provides another radiographic clue that the internal anatomy will be of the C-shaped variety.



FIGURE 15. An example of a Type II Semicolon C-shaped orifice arrangement.

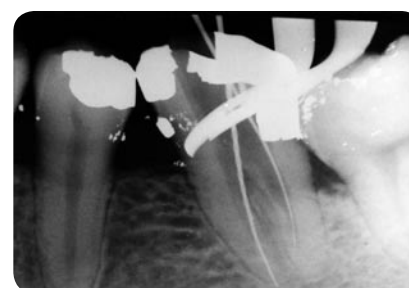


FIGURE 18. Instrument placement in the molar of Figure 17 shows that the instruments are near the furcation and close to a perforation.

is approximately 8 percent, but can be as high as 31 percent in Asian ethnic groups.³

C-shaped molars develop when Hertwig's epithelial root sheath fails to fuse either on the buccal or lingual surface. That fusion failure results in a groove on the opposite side of the root that is present coronally¹⁵ (FIGURES 12, 13).

A classification system was proposed by Melton and others that detailed the external and internal anatomical and histological features of C-shaped molar anatomy.¹⁶ In a study of 15 extracted teeth, they described the dentin-canal space isthmus as occurring approximately equally on both the buccal and lingual. In the Type 1 continuous form, the internal canal space is seen as a single con-

tinuous crescent-shaped space without separate orifices. The Type 2 Semicolon arrangement may have two connected orifices with a separate space, and the Type 3 arrangement is represented by three separate orifices that are connected to varying degrees throughout to body of the root (FIGURES 14, 15).

Diagnostic interpretation and instrumentation modifications are required to overcome the clinical challenges presented by C-shaped canal systems. In the case of this anatomical anomaly, internal canal space form cannot be ascertained from clinical crown shape. Radiographic examination, however, can provide information supporting the diagnosis of a C-shaped root.

Not all teeth in this category have conical-tapered root apices but there are radiographic clues that may indicate the presence of a C-shaped molar. Frequently, the tooth will appear as a typical two-rooted mandibular molar because the dentin isthmus connecting the main mesial and distal root areas is very thin and not radiographically evident. In other instances, the roots will appear with flattened apices as this area represents the connecting dentin isthmus (FIGURE 16). Canal spaces seen radiographically in C-shaped molars may appear unusually eccentric toward the furcation (FIGURES 17, 18).

Instrument placement in the thin dentin isthmus may appear radiographi-

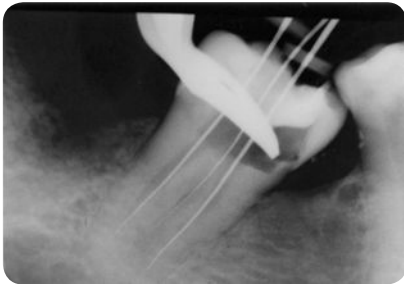


FIGURE 19. The middle instrument has been placed in a thin connecting isthmus of this C-shaped molar. The file appears to have perforated the furcation since the isthmus is too thin to be radiographically evident.

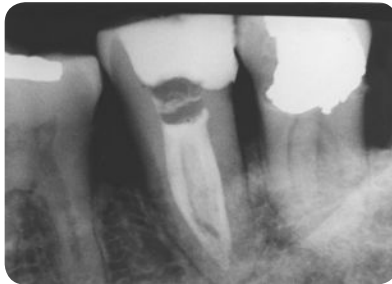


FIGURE 20. Obturated C-shaped molar with Type II Semicolon arrangement. The connecting isthmus has been appropriately debrided and obturated.

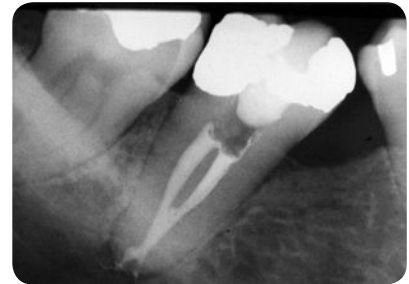


FIGURE 21. C-shaped mandibular second molar with a deep connecting isthmus.

cally as a furcation perforation (**FIGURE 19**). The dentin in this area is too thin to be radiographically opaque. Debridement and flaring in this area has to be minimal to prevent strip-perforation of the thin isthmus (**FIGURE 16**). With careful debridement and soaking with sodium hypochlorite, the thin isthmus can be safely debrided and obturated (**FIGURES 20, 21**).

Internal fiber optic light transillumination can be used to enhance canal space anatomy when searching for spaces. When the tip of a fiber optic light is placed under the rubber dam, the canal space will appear as a dark line or area demarcating the pulp space.

The use of thin ultrasonic tips in isthmus areas is invaluable for safe debridement. Warm vertical gutta-percha compaction is an essential method for complete obturation of the various internal space configurations presented by the C-shaped variant.

Conclusions

Familiarization with dental anomalies, specifically those pertaining to endodontic treatment will enable the provider to prevent inaccurate diagnosis that can potentially lead to inappropriate treatment or procedural errors.

Some anomalies such as dens evaginatus and the subsequent pathosis seen with early pulp necrosis will more likely be seen in children. As the Asian and Pacific Islander population grows in the western states, and as those populations migrate

throughout the United States, all health care providers should be aware of diagnostic and treatment technique modifications required to overcome the clinical challenges posed by various anatomical anomalies. ■■■■

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Improving Decision-making in Restorations: Evaluation of Impressions and Working Casts

GITTA RADJAEIPOUR, DDS

ABSTRACT The success of a crown greatly relies on its margin. An ill-fitted crown with an open margin will be susceptible to leakage and recurrent decay. If it remains undetected, it will eventually cause serious problems. This report looks at the finish line consistency of 73 “clinically acceptable” impressions made by dental students and working casts poured in the laboratory section. Findings show a number of possible inaccuracies in preparations, impressions, or a combination of both.

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Marginal integrity is an important element in evaluating a restoration; however, there is no general agreement about the definition of a clinically acceptable margin. A good quality impression is a prerequisite to the fabrication of a well-fitting laboratory-made restoration.¹ With regard to the evaluation of preparations, Rosentiel, Land, and Fujimoto indicated, “the impression may still be acceptable when a small defect is present in noncritical area (e.g., away from the margin of a prepared tooth). Careful judgment must be exercised.”²

When making an impression of a crown, capturing the margin becomes the most significant part when evaluating whether an impression is acceptable or not. The restoration can survive in the biological environment of the oral cavity only if the margins are closely adapted to the cavosurface finish line of the preparation.³ When the margins of a cast restora-

tion are to be duplicated from a working cast, an essential element is ensuring the presence of a detectable and well-defined finish line on a tooth prior to making an impression. One of the most frustrating problems associated with impression-taking is the fact that an impression may look perfect but is actually distorted. Much time is wasted in making the crown, scheduling the patient, trying to seat the crown, and remaking the impression.⁴

Methodology

Student cases for crowns and bridges are evaluated through two steps of quality control at the University of the Pacific, Arthur A. Dugoni School of Dentistry. An impression taken by the students is initially evaluated by the faculty and students in the clinic. Additionally, the poured-up working casts are evaluated in the lab to assure the quality of the prostheses to be delivered to the patients.

The intent of this study was specifically to reevaluate the poured-up casts and

obtain rationales or a line of reasoning for unacceptable impressions and working casts. Identifying the most common problems found in impressions, that taken by dental students in restorative procedures.

When making impressions, students are challenged to produce clinically acceptable impressions. In some cases, several

attempts are made prior to producing an acceptable impression. Only one impression maybe submitted to the lab for fabrication of a crown. In this study, 73 impressions were evaluated. Data were collected randomly from the cases submitted by second- and third-year dental students. The assessment included 292

surfaces of 73 tooth preparations for various cast restorations. The variety finish line designs included chamfer and 90- or 120-degree porcelain shoulders. All 73 impressions had been examined microscopically by clinic floor faculty and passed as “clinically acceptable,” using a high-power stereoscope X 10 model BM40455. In the

TABLE 1

Classification of Errors in the Margins of the Prep on the Study Casts and on the Impressions

Finish Line of Prep	Type of Error	Description
On the working cast	None existing or light	Finish line fades from the prep to the tooth; there is no margin (FIGURE 5) or it is too light (FIGURE 1).
	Not continuous	Finish line does not go all around the tooth; it looks like a zigzag or stepped margin (FIGURE 2).
	Double or several finish lines	There are two or several finish lines on top of each other (FIGURE 4).
	Rough finish line	Finish line has many scratches or nicks from the bur; it is not a sharp or well-defined line (FIGURES 6, 7).
	Fuzzy finish line	It is not possible to tell the difference between the finish line and the prep (FIGURE 5).
	Finish line not appropriate	Finish line design not correct for the requested type of prosthesis (FIGURE 6).
On the impression	Bubble on finish line	Small bubbles are easily identified; large bubbles on the finish line are harder to identify (FIGURE 8).
	Folding of impression	This occurs when there is saliva or too much moisture in the sulcus. Moisture on finish line.
	Tear	This occurs if the impression is removed prior to complete setting or if the impression cuts in the cord.
	Cord on the finish line	An impression of the cord has been picked up with the impression and is on or next to the finish line (FIGURE 3).
	Distortion of impression	Separation of material from the tray due to inadequate tray adhesive. Different setting time of light/heavy body impression material.

laboratory, a total of 29 percent of these cases were rejected and they were not accepted for cast fabrication. The same high-powered scope was used for reevaluation; the working casts and working dies were evaluated in a laboratory environment as opposed to evaluating impressions and preparations in patient's mouth. Establishing guidelines and requirements for an acceptable working die from the

laboratory point of view will be beneficial for practitioners to look for potential errors early on. At the same time, calibration of dentists, faculty, lab technicians, and students will reduce the number of remakes. It should also be noted that when assessing a case, the operating environment in clinic is more challenging than the laboratory environment. Evaluation of the finish line on a die under a high-power

scope is easier than evaluating a preparation in the mouth or an impression.

Summary

The outcome showed inaccuracies could occur in three categories: 1) errors in the preparations alone; 2) errors in the impressions alone; and 3) errors in both preparations and impressions. Results included: 18 percent of the errors were on finish lines of the prepared teeth; 8 percent of the errors were in the impressions; and 4 percent were in both the impression and the prepared tooth. Seventy percent of the die stones were determined acceptable for fabrication of the requested prostheses.

In general, flaws in cast restorations could be visible or invisible flaws. Most visible flaws can be identified by the technician. Invisible flaws are dis-

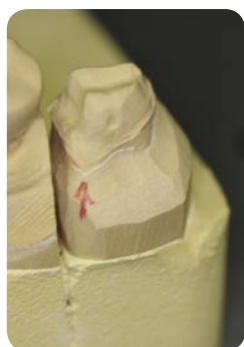


FIGURE 1. Light finish line.

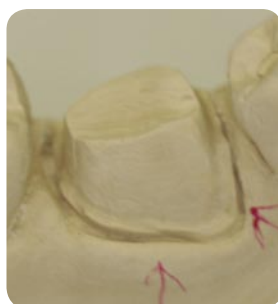


FIGURE 2. Finish line not continuous.



FIGURE 3. Cord on finish line.



FIGURE 4. Double finish line.



FIGURE 5. Unidentifiable finish line.



FIGURE 6. Preparation and impression unacceptable.



FIGURE 7. Rough finish line.

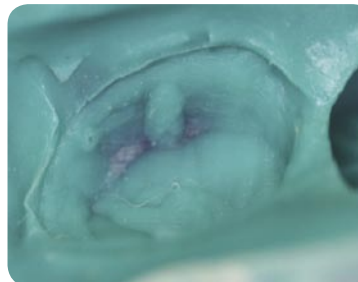


FIGURE 8. Bubble on impression.

covered at the time of placement of the restoration. The most common visible flaw is the lack of a visible finish line. Such defects are usually the result of inadequate gingival management.⁵

Results

The results of this study are shown in **TABLE 1** and have been divided into two categories: evaluation of the finish lines of the preparations on the casts; and on the impressions. The classification of errors (**TABLE 1**) is based on the cases evaluated and visible flaws.

Discussion

The scope of this study was limited to the evaluation of the margins of the preparations and the impressions by dental students. It is necessary to point out there could be other problems, which might not be related to the margins and that might cause a case to be rejected. These problems might include errors in prescription, errors with casts, errors in mounting, errors in the articulator itself, and others. ■■■■

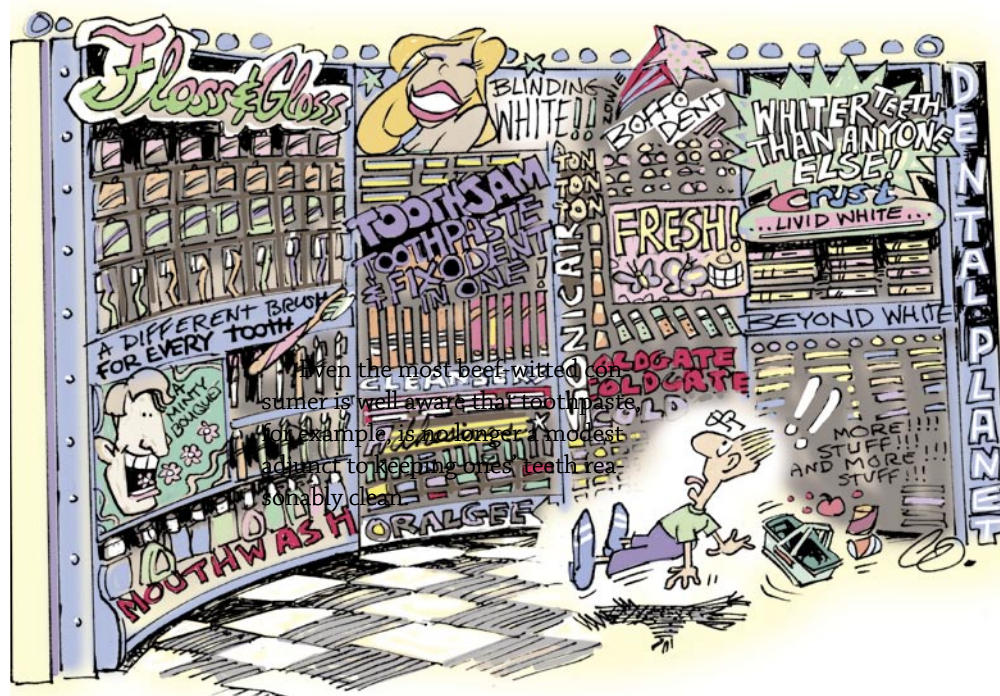
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Product-palooza!



The companies should devote some thought to the frequent unsettling tableau wherein a customer, moaning piteously, lies prostrate in the aisle unable to decide.

→ Robert E. Horseman, DDS

ILLUSTRATION
BY CHARLIE O.
HAYWARD

The practice of dentistry has advanced so much in recent years that it is now impossible for a dentist **not** to find something wrong with you. Teeth that have hitherto appeared to be shining examples of Nature's finest effort, are revealed by laser devices as candidates for the endodontist. Anterior teeth that have appeared only yesterday to be in lovely juxtaposition, suddenly require the wizardly applications of porcelain to prevent their owner from immuring herself in a nunnery.

To keep pace with dentistry's advances, the pharmaceutical industry has proven itself to be no slacker when assigned the task of formulating cures, palliative and prevention drugs and devices. Short of an instant fix for a major maxillofacial catastrophe, such as one might encounter in a face-off with a Peterbilt truck, your local supermarket's formidable dental aisle has every imaginable answer to most of dentistry's problems.

- Toothache kit? Yes.
- Temporary cement? You bet!
- Tooth whitening paraphernalia?

Take your pick.

- Bad breath? Paste, liquid or gel; no problem.
- Mirrors, explorers, tongue scrapers, Quik-fix repair kits? Of course!
- Implant kits? Coming.

Even the most beef-witted consumer is well aware that toothpaste, for example, is no longer a modest adjunct to keeping ones' teeth reasonably clean. Dentistry is beholden to public-spirited conglomerates like Colgate and Crest, among others, who enjoin the public via the media to spend less time worrying about the state of the world and pay more attention to its oral health. In reality, the companies should devote some thought to the frequent unsettling tableau wherein a customer, moaning piteously, lies prostrate in the aisle unable to decide between Crest's Whitening Expressions Refreshing Vanilla

CONTINUES ON 657

DR. BOB, CONTINUED FROM 658

Mint Liquid Gel and Colgate's Baking Soda & Peroxide Whitening Oxygen Bubbles Frosty Mint Striped Gel.

This dental bonanza is like a multiple-choice test with a hundred possible answers. The consumer's strategy is limited to eenie, meenie, minee, mo despite the fact that companies devote media campaigns to bind him in lifetime loyalty costing more than the total assets of many Third World countries. A mind-boggling scrolling of their Web sites confirms that Colgate, for instance, offers at least three dozen types of toothpastes. Crest, not to be outdone, proudly displays its multiple choices of toothpastes and gels. There are now enough toothbrush types for the conscientious brusher to have a different configuration for each of his or her 32 teeth.

I don't recall there ever being a public clamor for so many options.

IRATE CUSTOMER TO CLERK: Hey, how come there're only 10 kinds of toothpaste here? This is a supermarket?

CLERK (cowering): I'll call the manager!

The average patient, unless driven by some obscure dental angst encountered in a Krafft-Ebing 19th century textbook, is quite content with one flavor of toothpaste and one serviceable toothbrush he fondly believes should last him upward of a year. He selfishly has other fish to fry, so all this competition for the consumer's attention is immense.

One of life's tough decisions is when to discard a toothbrush. I once had a concept of a new type brush that announced its demise by harmlessly exploding when the bristles sagged 15 degrees out of vertical, much on the order of a trick exploding cigar. In deference to the companies that have done so much for us, I demurred in favor of their submission of bristles that gradually change color when a certain amount of time has passed. This requires the brusher to make a subjective analysis of hue and color saturation,

a task better assigned to an interior decorator. An ineffective solution, I feel, compared to my attention-grabbing alternative.

When Oral-B offers a baker's dozen of manual toothbrushes and Colgate counters with as many or more, to say nothing of those of other brands of brushes, what's a poor consumer to do?

"Ask your dentist," is the advice frequently proffered to bewildered patients when confronted with a 100-foot long aisle of dental products in the supermarket. Splendid idea, like asking your physician what to do about age spots on the back of your hands.

"What do you use?" the dentist hopes they don't ask. The answer be-

ing — if he's honest — "Whatever the company reps give me as samples." To paraphrase King Lear, "How sharper than a serpent's tooth to be an ungrateful recipient!" King Lear, by the way, was edentulous and lived the last years of his life entirely on gruel.

It behooves us as professional oral health persons responsible for the popular *Flossing for Dummies* manual, to become acquainted with even the lesser-known of these products if we are to make intelligent recommendations. Smug and irritating as it is, sound advice such as "You are required to floss only the teeth you want to keep" should do much to reduce the confusion of runaway multiple choices. ■■■■