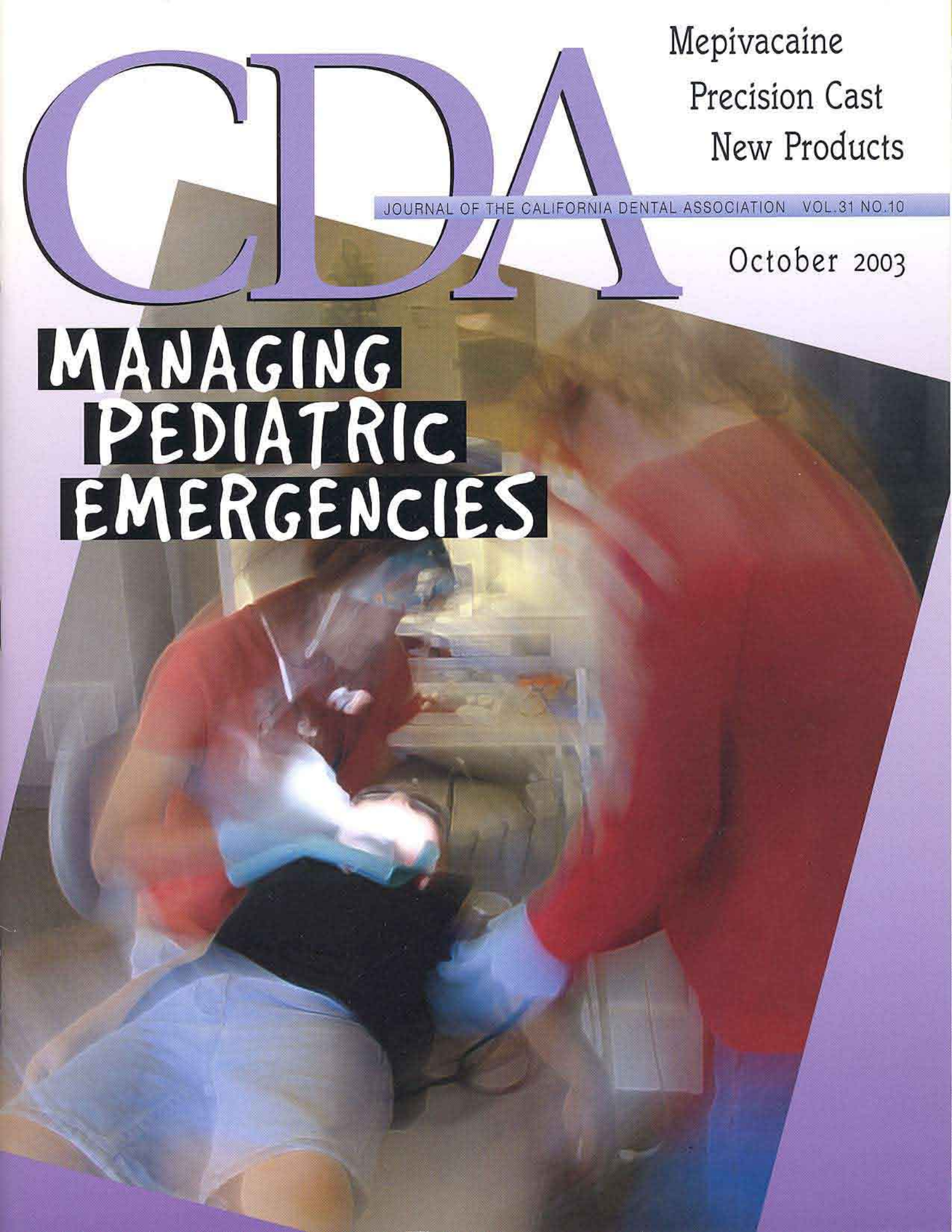
CDA
JOURNAL OF THE CALIFORNIA DENTAL ASSOCIATION VOL.31 NO.10
October 2003

Mepivacaine
Precision Cast
New Products

MANAGING PEDIATRIC EMERGENCIES



OF THE CALIFORNIA DENTAL ASSOCIATION
Journal
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DEPARTMENTS

FEATURES

Jack F. Conley, DDS

Ethics, Trust, and Image

Traditionally, dentistry has been the beneficiary of a strong public image. Much of that reputation was attributed to the influence of a strong Code of Ethics. Twice in the past decade, we commented in this column on results of public opinion polls conducted by the Gallup Organization that showed dentistry placing in the top five professions based upon public perceptions of trust and respect. Based solely upon memory, the most recent of those polls that we personally reviewed placed dentistry between second and fourth out of all professions surveyed.

In recent years, many events have contributed to an assault on that image. It is easy to identify media activity that has negatively affected the profession's image. Legal matters involving use of amalgam and Proposition 65, and the ongoing efforts of the anti-fluoridationists to undermine dentistry's preventive efforts are just a few of the specific issues the media has communicated to the public.

There have been some recent reports and events that offer a reality check for the profession. They provide an opportunity to reflect on our current and future efforts to improve dentistry's image.

Item: A recent Gallup poll shows dentistry falling from No. 2 to No. 8 in public opinion when evaluating all professions with regard to honesty, integrity, and trustworthiness.

Item: A different Gallup poll dated Aug. 18, measuring the image of 25 business and industry sectors, found the health care industry, of which dentistry is a small part, next to last in terms of positive image.

Item: On Aug. 20, it was announced that the American Dental Association and Aetna reached an agreement that seeks to improve communication and collaboration that will lessen the complexity in the payment of dental claims, ultimately enabling more-effective service to patients.

Item: On June 29, the CDA Board of Trustees adopted a plan that will help to revitalize the role and importance of the Code of Ethics in the future of the California Dental Association.

We believe that each of these reports and actions is interrelated in explaining where dentistry's image might presently be and where we might move it in the future.

The reference to a Gallup poll survey that measured dentistry's image in comparison with other professions, appeared in a midyear dental newsletter. While we were not able to either confirm the date of the poll or validate its accuracy, we were not surprised by this ranking and believe that it shows that dentistry's public image is probably not as strong as it was a few years ago. We have already listed some of the public issues that probably have negatively influenced public opinion. There are also the individual surveys by journalists such as one commented on here in July 2002 titled "A Profession in Decay — Dentists' Business Practices Increasingly Suspect" that not only damage the public image of the profession but, realistically, point to abuses that have been occurring in some dental practices.

In an effort to validate the preceding Gallup poll results, we encountered the results of a different Gallup poll that evaluated the public image of 25 business and

Many events have contributed to an assault on dentistry's image.

A potential cause of patient dissatisfaction and distrust arises out of the marketing of cosmetic dentistry.

industry sectors in the United States. The health care industry sector rankings were alarming. Out of 25 sectors, the only one with a lesser image was the oil and gas industry. You name it — automobile industry, banking, legal, education, sports, etc. — they all have had a better reputation than the health care industry in each of the past three years, according to this public survey.

Admittedly, dentistry is a very small segment of the health care industry, which includes medicine and hospitals as the major players. However, we believe that some key factors related to all members of this sector — namely rising costs and the relationships of dentists and other health care providers with the insurance carriers and benefit plans, may explain this group's unenviable position in the eyes of the public.

Some business practices of insurance carriers resulted in the recent ADA legal action against some major carriers and are part of a problem that has often alienated patients from their dentists. Also, the failure of many practitioners to educate their patients about the benefits of their plan and to properly manage the claims for treatment they render, further strains relationships with patients who believe that their benefit plan will cover all of their needed dental treatment. When insufficient communication between dentist and patient occurs, and patients receive an unexpected billing for services or less than anticipated benefits, the result is mistrust and resentment — not necessarily with their employer or dental plan, but with the dental practitioner or staff who failed to properly inform them of what their financial responsibility would be. Many colleagues fail to recognize that it is their responsibility to educate patients about benefit plans. No one else has that responsibility today.

Another potential cause of patient dissatisfaction and distrust arises out of the marketing of cosmetic dentistry. Unlike reparative restorative dentistry, periodontal therapy, or endodontic therapy that may resolve discomfort and restore function, cosmetic procedures such as bleaching are elective. Elective procedures, particularly if they bring only short-term satisfaction, are far more likely to bring about dissatisfaction and distrust. This will occur if patients believe that the treatment was neither a need nor want, that they were pressured by the dentist to "purchase" the treatment in the first place, and the treatment is evaluated by another dentist a relatively short term later with a recommendation to replace or repeat (i.e., bleaching). Therefore, our opinion is that some of the less traditional, newer forms of therapy "marketed" in dental offices today, if they fail, or fail to live up to the expectation of the patient, are more likely to result in a lack of trust, thus reducing the image of the profession in general.

The ADA agreement reached with Aetna provides hope that in the future, greater communication, education, and understanding can guide the relationships between dentist, patient, and third parties. With time and education, there should be much less opportunity for patients to lose trust in their dentists as a result of a misunderstanding of their insurance benefit programs.

Finally, we look forward to seeing a renewed focus on ethics within the profession. The CDA board has taken a very small step forward. The task force appointed to carry out this review has a large responsibility. Bringing ethical principles and values back into the forefront of dental practice decision-making in the 21st century will be a major factor in helping to restore the public image of the dental profession to previous levels. CDA

ADA Session Heads to San Francisco

The American Dental Association will host its 144th Annual Session, Thursday, Oct. 23, through Sunday, Oct. 26, 2003, at the Moscone Center in San Francisco. The 2003 Session features a variety of continuing education programs, technical exhibits, and networking opportunities designed to enhance the community of dentistry.

More than 180 scientific programs are planned for the Session. This year's program offers C.E. options for every member of the dental team — dentists, hygienists, dental assistants, business managers, business assistants, and dental technicians. The

scientific program provides participants with the education needed to enhance their professional knowledge and clinical skills. These in-depth sessions will present the latest developments in dental-related subjects such as endodontics, esthetic dentistry, conservative operative dentistry, and finance.

ADA Session Highlights

ADA/Sonicare Distinguished Speaker Series

On Friday, Oct. 24, Rudy Giuliani looks back at the leadership lessons learned in a lifetime of public service and how they came together to provide strength at a defining moment in America's history. On Sunday, Oct. 26, Gen. H. Norman Schwarzkopf defines universal principles of leadership and how they apply to every aspect of one's life.

The ADA/Sonicare Distinguished Speaker Series is open to all registered attendees – tickets are not required. An ADA Annual Session badge is required for entry.

ADA Special Events — Dana Carvey and the Beach Boys

ADA offers the best in evening entertainment. On Friday night, *Saturday Night Live* alumnus Dana Carvey will share his comic viewpoints. The entertainment continues on Saturday evening with the legendary Beach Boys.

ADA Foundation Health Screening Program

The ADA Foundation Health Screening Program has been conducted at the ADA Annual Session since 1964. During that time, information gathered by the program has become the largest national database on the health of dental professionals. The program has provided invaluable data that has proved useful in developing clinical policies and recommendations that make dental offices safer for patients and dental care providers.

All dentists and hygienists who register for the Annual Session are invited to participate in the ADAF Health Screening Program, which will be held in Moscone North – Hall D.

Screening hours are 9 a.m. to 4 p.m. Thursday through Sunday of the Session.

ADA Annual Session attendees will have the opportunity to earn more than 30 C.E. units and select from more than 25 hands-on workshops. In addition, the following specialized programs are available: ADA Women's Health and Leadership Program, Two-Day Esthetic Forum, Technology Day Program and Exhibits, and the Team Building Program.

Session attendees will also have the opportunity to extend their educational opportunities beyond the classroom. They will be able to interact with representatives from the approximately 625 companies expected to participate in the technical exhibition. The technical exhibition will give them firsthand exposure to the latest in dental technology to enhance their patient treatment and practice management. The California Dental Association will be among the exhibitors.

Again this year, ADA will present the Distinguished Speaker Series, featuring some of the world's most renowned speakers. Keeping with Annual Session tradition, ADA has planned a series of evening entertainment and social events facilitating networking among colleagues.

For more information on the 144th Annual Session and other ADA events, contact the American Dental Association at 211 E. Chicago Ave., Ste. 200, Chicago, IL 60611-2678; (312) 440-2388 or (800) 232.1432; or annualsession@ada.org or watch for updated Session information at www.ada.org/goto/session.

Empathy Key to Providing Care to Parkinson's Patient

To provide competent oral health care to patients with Parkinson's disease, dentists must understand the disease, its treatment, and its impact on the patient's ability to undergo and respond to dental care, according to an article in the May 2003 *Quintessence International.*

Researchers at the University of Texas Health Science Center at San Antonio wrote that Parkinson's disease is the fourth most common neurodegenerative disorder in the elderly, affecting an estimated half-million people. Oral health care providers can expect to be called upon to care for patients with this progressively debilitating disease, they noted.

When treating patients with Parkinson's disease, dentists must exercise empathy and a positive regard, the researchers say. Dentists should strive to reach preventive and therapeutic goals with the same ethical, moral, and professional standards of care appropriate in the management of other patients.

Oral complications include oral motor and sensorimotor impairment, dysphagia, xerostomia, and burning mouth.

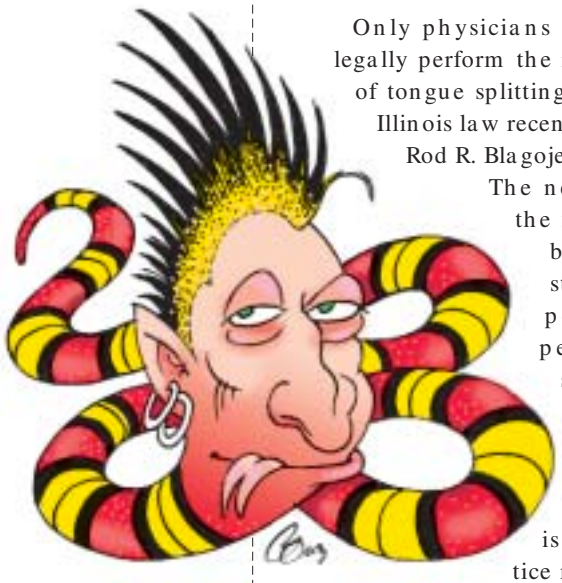
The researchers noted that in patients with Parkinson's disease, tremor is an early sign and generally affects the hands, lips, and tongue. Tremor and rigidity of the orofacial musculature may induce orofacial pain, temporomandibular joint discomfort, cracked teeth, soft tissue trauma, displaced restorations, attrition from ruminations, and ptyalism. At least 75 percent of patients with Parkinson's disease have disordered speech or voice, the researchers said.

Another oral complication, dysphagia, is reported by as many as 50 percent of patients with Parkinson's disease. Slowed swallowing can further contribute to ptyalism, which in turn can lead to angular cheilosis and further angular irritation by frequent blotting of the lips and mouth.

The incidence of xerostomia among patients with Parkinson's is reported to be as high as 55 percent, the researchers noted. Chronic xerostomia may result in painful oral soft tissue problems and poor tissue adaptation to prostheses.

The researchers stressed that dentists also should be sensitive to the needs of the patient's family and caregivers. They said that an essential part of any successful strategy to optimize the quality of life for patients with Parkinson's disease is familiarity with and access to available resources.

Illinois Legislation Limits Who Can Split Tongues



Only physicians and dentists can legally perform the relatively new fad of tongue splitting, according to an Illinois law recently signed by Gov. Rod R. Blagojevich.

The new law, which is the first of its kind to be enacted in any state, declares: "A person may not perform tongue splitting on another person unless the person performing the tongue splitting is licensed to practice medicine in all its branches under the Medical Practice Act of 1987 or licensed under the Illinois Dental Practice Act." A first-time violation of this new law is considered a Class A misdemeanor. A second offense is a Class 4 felony.

While not as popular as piercing or tattooing, tongue splitting does have a subculture of popularity among young people in their late teens and early 20s. The act seems to attract people who want to create a forked or lizard-like tongue. Too often the procedure is performed in tattoo parlors or other locations that lack the necessary emergency equipment or sanitary environment.

The American Association of Oral and Maxillofacial Surgeons reports that no oral and maxillofacial surgery training institutions teach a tongue splitting procedure, though an oral surgeon would be qualified to do so based on his or her hospital-based surgical residency and training.

While endorsing the governor's decision, the oral surgeons' association cautioned the public about pursuing the tongue splitting procedure. Dr. Larry W. Nissen, president of the association, noted that, "Side effects can include serious infection, as well as significant alteration in speech and taste. There are also many large blood vessels in the tongue that, if damaged, could lead to life-threatening bleeding."

Service Provides Information on Safety of Products

The National Institutes of Health has unveiled a consumers guide that provides easy-to-understand information on the potential health effects of more than 2,000 ingredients contained in more than 4,000 common household products.

Some household products contain substances that can pose health risks if they are ingested or inhaled, or if they come in contact with eyes and skin. The National Library of Medicine's Household Products Database (http://householdproducts. nlm.nih.gov) provides information in consumer-friendly language on many of these substances and their potential health effects.

Information in the database is provided to the National Library of Medicine under a collaborative agreement and is derived from publicly available sources, including brand-specific labels and information provided by manufacturers and their web sites. The list of products covered will be expanded, and information for products currently in the database will be updated at least annually.

Scaling May Reduce Risk of Premature Births

A nonsurgical dental procedure may reduce the risk of preterm birth in pregnant women with periodontal disease, according to new study findings. Nearly 12 percent of babies in the United States are born preterm (before 37 completed weeks of pregnancy), which increases their risk of death and lasting disabilities, such as mental retardation, cerebral palsy, lung and gastrointestinal problems, and vision and hearing loss.

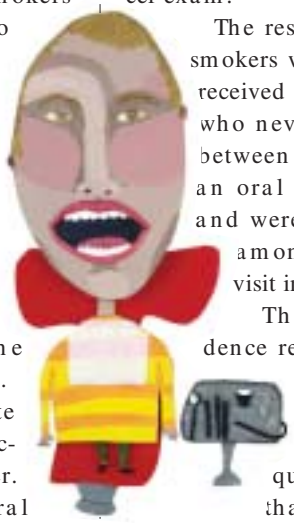
The report was published in the *Journal of Periodontology* and is based on 366 pregnant women who had periodontitis and found as much as an 84 percent reduction of premature births in women who were less than 35 weeks pregnant and who received scaling and root planing. Researchers also found that adjunctive metronidazole therapy did not improve pregnancy outcome. In fact, women who were given the antibiotic after scaling and root planing had more preterm births than patients receiving scaling and root planing and a placebo.

"What this tells us is that scaling and root planing may significantly reduce a mother's chance of having a preterm birth," said Marjorie Jeffcoat, DMD, author of the study. "We found no evidence that the addition of an antibiotic to scaling and root planing was of benefit in this study. However, more research needs to be conducted to determine the reason for the decrease in efficacy."

Previous research reported that periodontal infections cause a faster-than-normal increase in the levels of prostaglandin and tumor necrosis factor molecules that induce labor, thus causing premature delivery before the fetus can grow to a normal birth weight. However, this is the first intervention study that offers advice on reducing the risk of premature births with scaling and root planing therapy alone.

Oral Cancer Exams Critical for High-Risk Adults

Dental practitioners should improve the provision rates of oral cancer examinations, especially among current smokers and edentulous alcohol users who have not been to the dentist in the past year, wrote researchers in the spring 2003 issues of the *Journal of Public Health Dentistry*.



The conclusion is based on a study of the findings of the 1998 National Health Interview Survey, wrote Mark D. Macek, DDS, DrPH; Britt C. Reid, DDS, PhD; and Janet A. Yellowitz, DMD, MPH; of the Baltimore College of Dental Surgery.

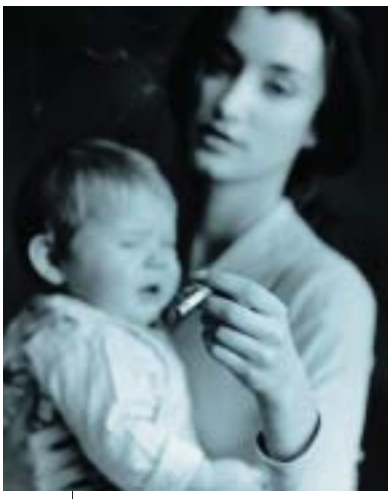
The authors noted that cigarette smoking and alcohol use are risk factors for oral and pharyngeal cancer. Recommendations for periodic oral cancer examinations highlight the importance of examining high-risk smokers and alcohol users. Their investigation assessed whether cigarette smoking and alcohol use were associated with receipt of an oral cancer exam.

The researchers found that current smokers were no more likely to have received an exam than were patients who never smoked. The association between alcohol use and receipt of an oral cancer exam were mixed, and were generally more favorable among those who had a dental visit in the last year.

The authors noted that evidence relating the sensitivity of an oral cancer exam to early detection and lower incidence rates is still under question. They said, however, that until a more sensitive detection measure is discovered, the periodic oral cancer exam represents the only tool available to health care practitioners.

Trick or Treat

According to Research!America, Americans spent nearly $2.025 billion on Halloween candy in 2002. That amount would fund the National Institute of Dental and Craniofacial Research for almost six years.



Secondhand Smoke and Caries Linked in Children

Young children who are exposed to secondhand smoke have a much higher rate of caries than do children who do not grow up around smokers, according to a study published recently in the *Journal of the American Medical Association*.

According to the Agency for Healthcare Research and Quality, which supported the study, this is the first study in the United States to associate secondhand smoke with caries. Although the occurrence of caries in children has declined dramatically in the United States, little headway has been made in reducing it among children living in poverty, who generally have less access to dental care and appear to be more vulnerable to caries.

Based on data from household interviews and health examinations of about 4,000 children ages 4 through 11, the study found that children had an increased risk of developing caries if they had high levels of cotinine, a byproduct of nicotine that is consistent with secondhand smoke exposure.

About 32 percent of the children with cotinine levels consistent with secondhand smoke exposure had carious surfaces in their primary teeth, compared with 18 percent of children with lower levels of cotinine. The higher risk of developing cavities in tobacco-exposed children persisted after controlling for other factors such as poverty and frequency of dental visits.

The study did not find a similar association between secondhand smoke exposure and cavities in permanent teeth.

Upcoming Meetings

2003

Oct. 23-26	ADA Annual Session, San Francisco, (800) 232-1432.
Nov. 2-7	U.S. Dental Tennis Association Annual Meeting, Palm Desert, Calif., (800) 445-2524.
Nov. 8-9	International Conference on Evidence-Based Dentistry, Chicago, j.ryley@elsevier.com
Nov. 16-22	Annual Meeting of the U.S. Dental Golf Association, Scottsdale, Ariz., (631) 361-7127, usdga@optonline.net.
Dec. 5-7	California Academy of General Dentistry Annual Meeting, San Diego, (877) 408-0738, www.cagd.org.

2004

March 3-6	Academy of Laser Dentistry 11th Annual Conference, Palm Springs, Calif., (954) 346-3776, www.laserdentistry.org.
April 15-18	CDA Spring Scientific Session, Anaheim, Calif., (866) CDA-MEMBER (232-6362).
Sept. 8-11	International Federation of Endodontic Associations Sixth Endodontic World Congress, Brisbane, Queensland, Australia, www.ifea2004.im.com.au.
Sept. 10-12	CDA Fall Scientific Session, San Francisco, (866) CDA-MEMBER (232-6362).
Sept. 30-Oct. 3	ADA Annual Session, Orlando, Fla., (312) 440-2500.

To have an event included on this list of nonprofit association meetings, please send the information to Upcoming Meetings, *CDA Journal,* P.O. Box 13749, Sacramento, CA 95853 or fax the information to (916) 443-2943.

Honor

Steven A. Gold, DDS, of Santa Monica, Calif., won first place in the annual William J. Geis Award for editorial writing with his essay "Healing or Hustling?" which appeared in the August 2002 issue of the *Journal of the California Dental Association*. Gold is the associate editor of the *Journal.*

New Products

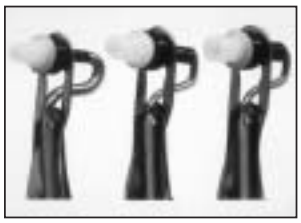
New product information listed here is derived from news releases received from the manufacturers. CDA does not endorse or recommend the products or procedures indicated, but provides this listing as a reader service.

GC Occlusal Matrix System

GC America has announced the launch of GC Occlusal Matrix System, a specially designed disposable tool that aids in speedily achieving the perfect occlusal surface. The Occlusal Matrix contains 50 pieces, 25 left and 25 right. The GC Occlusal Matrix System also allows the user to undertake multiple restorations in different parts of the mouth. Simply connect the handles of a male (left) and female (right) matrix together and adjust the shape to accommodate four different sizes of full arches. For more information, call (708) 597-0900.

Composite Carriers

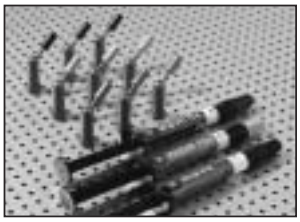
Cosmedent has introduced a line of Composite Carriers that allows for easy placement of material in Class I, II, and III restorations. These are ideal instruments to use for the delivery of all composites to the cavity preparation, and are available in three sizes (small, medium, and large) to ensure that the dentist has exactly the amount of material needed. Today's stiffer composites are much easier to dispense with these instruments, eliminating the inconvenience of working with unwieldy dispensing guns that require enormous strength. For more information, call Cosmedent, Inc., at (800) 621-6729.



Whitening Wand

Rembrandt Oral Care Products has introduced the Rembrandt Whitening Wand. One swipe of the easy-to-use sponge tip "wand" applicator instantly adds brightness and shine to teeth for that "just-brushed" look and feel, while freshening breath fast. The Rembrandt Whitening Wand contains a unique patented peroxide formula, which safely and effectively whitens teeth and freshens breath. Pain and sensitivity-free, the Rembrandt Whitening Wand works tooth whitening magic anytime, anyplace. For more information, call (800) 548-3663.

Wave, Wave MV, and Wave HV Flowable Composites



SDI has introduced the Wave, Wave MV, and Wave HV ideal versatile, fluoride-releasing, radiopaque, light-cured flowable composites designed for anterior and posterior restorations. The range of viscosities ensures that the dentist has a choice for all clinical situations. Some of the uses are Class V defects, small Class I and II restorations, gingival walls, pit-and-fissure sealants, blocking of small undercuts, enamel defect repair, abrasions, minor core build-ups, porcelain repair, and veneers. For more information, call (800) 228-5166.

GC Temp Advantage

GC America has announced the launch of GC Temp Advantage, a temporary cement for temporary crowns, inlays, and onlays. GC Temp Advantage is the only temporary cement to successfully incorporate all the critical additives that offer the best in temporary cements: fluoride, cholorhexidine, and potassium nitrate. It is offered in an affordable, easy-to-use automix syringe. The GC Temp Advantage package contains one ready-to-use syringe and 10 mixing tips. The tips will be available in refills of 10. For more information, visit www.gcamerica.com.

New Products

Ultra-Lume LED 5

Ultradent Products, Inc., has introduced the Ultra-Lume LED 5, the only LED light designed to meet all curing needs. Ultra-Lume has greater than 800mW/cm^2 with a curing mode of 10, 20, 30, or 40 seconds of cure time. The Ultra-Lume LED 5 has a tracking feature of one to four seconds. There is no return to a 20-second default; the time stays on the desired setting. The Ultra-Lume LED 5 fits into a handpiece holder, thus is takes up no counter space. The handpiece has a low-profile head, allowing greater comfort for the patient and eliminating stress on tissues and the temporomandibular joint. The LED display on the handle indicates the time. The handle is lightweight and has a large, raised on-and-off button. It is available with a 10- or 17-foot cord. For more information, call (800) 552-5512.

Hygenic Flexidam Non-Latex Dental Dam

Coltene/Whaledent, Inc., has introduced the Hygenic Flexidam Non-Latex Dental Dam. Hygenic Flexidam has an elastic elongation nine times its original length. This high level of elasticity means Hygenic's new non-latex dental dam has an extreme resistance to tearing and a resistance to puncture from bur and instrument contact. Because of the high elasticity of Hygenic Flexidam, the clinician is assured of a tight fit around the preparation for moisture control and effective isolation. Hygenic Flexidam Non-Latex Dental Dam is powder-free, odorless, and available in a 6-inch-x-6-inch nonreflective violet color. For more information, call (800) 221-3046.

SuperNatural Dentures and Partials

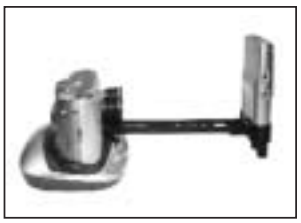
Precision Ceramics is now offering a revolutionary new denture system that will allow dentists and patients to enjoy the benefits of premium denture base materials processed with state-of-the-art injection equipment. In addition to having a precise fit and a choice of conventional or flexible bases, SuperNatural Dentures and Partials are the strongest and most fracture-resistant material on the market. The laboratory includes a lifetime warranty certificate with every case. For more information, call (800) 223-6322 or visit www.pcdl-usa.com.

Level 356 Dental X-Ray Film Processor

Fischer Industries, Inc., has announced the Level 356, a new automatic X-ray dental film processor. The Level 356 can be used virtually anywhere because it requires no plumbing or darkroom. It is compact, portable, economical in daily use, and simple to clean and maintain. It can accept any size film — from small intraoral films to panoramic and cephalometric films — on its 14-inch-wide feed tray. The Level 356 can also develop panoramic and cephalometric film side-by-side to save energy, chemistry, and time. The Level 356 is available online at www.fischerind.com or by calling (800) 356-5911.

Kodak DX4900 Dental Film Digitizer Accessory

Dentists can now digitize their dental film X-rays or color slides with the click of a camera shutter, using a new accessory for the Kodak DX4900 Dental Digital Camera Kit. The dental film digitizer accessory allows dental pro-



New Products

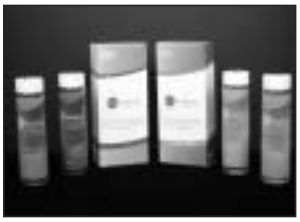
fessionals to mount and photograph intraoral X-ray films or photographic slides using the DX4900 camera with a close-up lens. The digitized images can then be easily transferred to office computers for integration with electronic patient records, for sharing with insurance companies, and for other electronic applications. For more information, call (800) 933-8031 or visit www.kodak.com/go/dental.

Spray-On Ceramic Glaze

By utilizing patent-pending technology, Speedent Dental Supplies now offers the world's first Dental Ceramic Spray-On Glaze for the production of crowns and bridges. Spray-On Glaze is compatible with all high-fusing porcelain systems and constructions, ranging from porcelain-fused-to-metal to milled and pressed ceramic restorations with one firing. It is the quickest, easiest, and most versatile dental glaze application on the market. It will increase efficiency, decrease in-process time, and reduce labor cost, all while providing a natural glaze. For more information, call (800) 706-0644.

AllSolutions Fluoride Foam

Dentsply Professional has introduced AllSolutions Fluoride Foam, the first product that combines great flavors in colored foam with a new unique, dependable nonaerosol dispensing pump. The foam is available in 2 percent neutral sodium fluoride (mint and peach flavors) and 1.23 percent acidulated phosphate fluoride (mint and berry cherry flavors) for professional topical application to aid in the protection against dental caries. The 2 percent neutral sodium fluoride is a nonacidic fluoride that is safe for patients with porcelain restorations, composite restorations, sealants, and xerostomia. For more information, call (800) 989-8825.



Commercial Air Sampler

RGF Environmental Group has announced the release of its Commercial Air Sampler. The Air Sampler was designed for quick and accurate air quality sampling using industry-standard 100 mm aerobic petri dishes. This unique indoor air quality sampler works by drawing in 500 L of indoor air and depositing the microbes onto a prepared petri dish. This dish is then incubated and numerated, providing an accurate representation of the air quality in the test area. The Air Sampler is easy to use, pre-calibrated, and a time-saving device (replaces settling plate methods). For more information, call (800) 842-7771.

Microbrush X Applicator

Microbrush Corp. has introduced the Microbrush X, the newest member of its popular family of Microbrush applicators. It is designed with a thinner, longer brush tip to simplify application for procedures involving confined applications such as bonding posts and inlays, onlay cementation, and subgingival use. The shorter, stiffer brush fibers hold a fraction of a drop of material for precise placement and allow for scrubbing. For ease of use, the applicator bends firmly to 90 degrees. The Microbrush X kit includes a cartridge of 100 applicators and a Microbrush X dispenser. For more information, call (866) 866-8698.

Brushtime Bunny

Brushtime Products, Inc., has announced the release of the Brushtime Bunny, a teaching tool for any dental practice that treats children. It helps dental hygienists give oral hygiene instruction to children. The Brushtime Bunny is a 12-inch-high cartoon-style rabbit holding a carrot in the right paw and a toothbrush in the left. The bunny's belly opens to reveal a mirror

New Products

and displays four important brush time tips. The carrot case is designed as a travel case and includes a toothbrush, toothpaste and dental floss, held together at the top with a cleverly disguised rinse cup. Children find everything necessary for dental hygiene care in one place, and the attractive bunny and motivating song encourages them to keep using it. For more information, call (866) 508-7400 or visit www.brushtimebunny.com.

Opalescence Mirrored Tray Cases

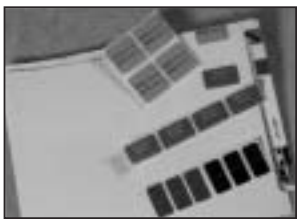
Ultradent has introduced a new way to carry and store direct semi-custom-fitted or indirect custom-fitted bleaching trays. These mirrored tray cases come in colors that coordinate with Opalescence flavors: mint, melon, and regular (green, pink, and purple). The tray cases can be purchased as a variety pack, or individual colors can be purchased in quantities of three. The Opalescence mirrored tray case is durable, handy, and convenient. The built-in mirror allows the patient to check his or her progress. For more information on Opalescence Mirrored Tray Cases, call (800) 552-5512.

Mini Air Purification System

RGF Environment Group has announced its new air treatment system designed specifically for dental offices and labs. RGF's APS Mini air treatment system is effective at reducing airborne mercury, mold, bacteria, viruses, and other chemical odors. This commercial quality stainless steel air treatment system utilizes RGF's proprietary Photohydroionization technology. This unit does not mask odors; it destroys them. It is designed to be either wall-mounted (vertically or horizontally) or positioned on a workstation close to the odor source with its optional stainless steel stand. For more information, call (800) 842-7771 or visit www.rgf.com.

HIPAA Compliance Folder Labels

Recently enacted HIPAA regulations say that patient health information must be protected and can no longer appear on the outside of patient record folders. Now, the Dental Record has labels to help dental offices comply with those rules and safeguard the protected health information of their patients. Two new labels can be attached to the outside of the patient's dental record folder to alert the office staff that the file is HIPAA-compliant. There is a bright pink, 1.5-inch-x-1.5-inch label made of sturdy Mylar, which reads "HIPAA Compliant" and folds over the edge of the patient's folder; and there is a 1-inch-x-1.5-inch blue label with the words "Privacy Notice" that can be affixed to the outside face of the patient folder. For more information, call (800) 243-4675 or visit www.dental-record.com.



Erkoscop Parallax Mirror

Easily visualize no-parallel situations during clinical treatment using the Erkoscop Parallax Mirror. Erkoscop's unique curved shape provides a parallax view of the entire arch. Using the Erkoscop, it will be easy to see if preparations are parallel and, if necessary, make adjustments. This ensures that the bridge framework will draw passively off the preparations, which helps prevent distortion of the bridge wax-up. A passive fit of the bridge framework also guarantees resistance-free seating and precision fit. The Erkoscop is $79. Call Glidewell Direct at (888) 303-3975 for more information.

Reach Clean Burst Dental Floss

Patients can freshen breath and clean between teeth to remove odor-

New Products

causing debris in one step with new Johnson & Johnson Reach Clean Burst Floss. The floss leaves behind a fresh, clean feeling with each use. Combining intense, high-impact flavor with superior cleaning, Johnson & Johnson Reach Clean Burst Floss is available in three flavors — icy peppermint, icy spearmint, and berry mint. For more information, call (212) 367-6923.

ProfessionalCare 7000 Series Power Toothbrushes

Oral-B Laboratories has introduced the ProfessionalCare 7000 Series, the brand's most advanced line of premium power toothbrushes. Headlining this series is the Oral-B ProfessionalCare 7850 DLX, an exclusive professional model, featuring enhanced oscillations and a new Professional Timer, all designed to make a noticeable difference in patients' oral health. The Oral-B ProfessionalCare 7000 Series offers the fastest pulsating action available — 40,000 pulsations per minute — and provides an oscillation speed of 8,800 oscillations per minute, an increase of 15 percent over the original Oral-B 3D Excel. For more information, call (800) 44-ORALB or visit www.oralb.com.

ReliaFlex

DeRoyal has introduced a surgical suction liner system called ReliaFlex that provides 28 percent more suction flow power than other liners while eliminating regurgitation and splashing. The increased suction flow delivered by ReliaFlex better evacuates the surgical site of blood and other fluids, with more clarity leading to safer patient care and more satisfied surgeons. Intense research and design went into engineering ReliaFlex liners to give them 20 percent larger diameter vacuum ports and hoses. ReliaFlex comes in three canisters sizes (1300cc, 1800cc or 3200cc), larger than most on the market, to collect more waste and reduce the need for multiple liners for a given procedure. For more information, call (800) 337-6925.

Crest Whitestrips Supreme

Procter & Gamble has announced the launch of Crest Whitestrips Supreme, the newest generation of Crest Whitestrips Professional and an outstanding professionally dispensed, at-home whitening option for patients. Clinical research shows that Crest Whitestrips Supreme whitens at least 65 percent better than commonly used tray-based whitening systems. Crest Whitestrips Supreme whitens up to 80 percent better than the Crest Whitestrips sold in retail stores and will be sold exclusively to dental professionals. Crest Whitestrips can also help grow a dental practice. Independent research conducted over a six-month period has shown that dental practices that sold Crest Whitestrips Professional Strength had a 92 percent increase in the number of patients who whitened their teeth. For more information, call (800) 543-2577 or visit www.dentalcare.com.

—Compiled by Jennifer Hail

This article continues the theme of the September 2003 *Journal*: Managing Medical and Behavioral Changes in Children.

Emergency Medicine in Pediatric Dentistry: Preparation and Management

Stanley F. Malamed, DDS

ABSTRACT

Medical emergencies can and do occur in the practice of dentistry. Although most emergencies take place in adults, serious problems can also develop in younger patients. The contemporary dentist must be prepared to manage expeditiously and effectively those few problems that do arise. Basic life support (as necessary) is all that is required to manage many emergency situations, with the addition of specific drug therapy in some others. Preparation of the office and staff includes basic life support (annually), pediatric advanced life support, development of an emergency team, consideration for emergency medical services, and the availability of emergency drugs and equipment with the ability to use these items effectively. As with the adult patient, effective management of pain (local anesthesia) and anxiety (behavioral management, conscious sedation) will minimize the development of medical emergencies.

Medical emergencies can and do occur in the practice of dentistry. Most medical emergencies develop when the patient, commonly an adult, is fearful or has inadequate pain control. The most common emergencies noted in adult dental patients include syncope (less than 50 percent), non-life-threatening allergy, acute anginal episodes, postural hypotension, seizures, acute asthmatic attacks, and hyperventilation.[1]

In the pediatric patient, the most common emergency situations seen in dentistry are associated with drug administration, most often local anesthetics and/or central nervous system depressants used for sedation. It is this author's firm belief that the most likely scenario for a serious drug-related emer-

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gency developing in dentistry is the following: a younger, lighter-weight child receiving multiple quadrants of dental treatment in the office of a younger, less-experienced, nonpediatric dentist (i.e., general practitioner).[2]

All dental practices must be prepared to manage potentially life-threatening emergencies, be the patient a child or adult. The following sections review the preparation of the dental office and staff to successfully manage medical emergencies that might arise in younger patients in the dental office.

The definitions of victims by age[3] are as follows:

Infant: < 1 year

Child: 1 to 8 years

Adult: ≥ 8 years

Preparation

The following four assets are critical in preparing the office and staff to recognize and effectively manage medical emergencies:

- The ability to properly perform basic life support;
- A functioning dental office emergency team;
- Access to emergency assistance; and
- The availability of emergency drugs and equipment.

Basic Life Support

Basic life support (or cardiopulmonary resuscitation) is the single most important step in preparation of the office and staff to successfully manage medical emergencies. BLS for health care providers is defined as: **P**osition, **A**irway, **B**reathing, **C**irculation, and **D**efibrillation. Most states mandate BLS certification for licensure to practice as a dentist. The majority of states also require BLS certification for dental hygienists, and some mandate certification for dental assistants.

Figure 1. Mouth-to-mask ventilation.

Figure 2. Head tilt-chin lift.

California has mandated BLS for licensure for many years. However, possession of a valid CPR card is no guarantee that BLS can be adequately performed. In an unpublished study of entering postdoctoral students (residents in endodontics, periodontology, prosthodontics, pediatric dentistry, oral and maxillofacial surgery, orthodontics, and general practice) at the USC School of Dentistry, 30 students "challenged" the BLS-recertification course that is mandatory for them. All had been certified in BLS at the health care provider level within the previous six months.[4] The challenge consisted of completing a 25-question written examination with a grade of 80 percent or better, and demonstrating "adequate" performance at one-person BLS on an adult victim. Only four of the students successfully challenged the course (13 percent). Most were unable to perform "adequate" one-person CPR on an adult victim for one minute.

Recertification in BLS is recommended annually (in most venues, CPR cards have a two-year expiry date). BLS instructors should be brought into the dental office, with mannequins placed in the dental chair and on the floor in the reception room. It should be mandatory for all office personnel to participate in this training. For health care providers, rescue breathing should be taught as mouth-to-mask ventilation, not mouth-to-mouth (**Figure 1**).

The importance of BLS as preparation for managing medical emergencies in children is highlighted by the fact that the primary etiology of cardiac arrest in children is airway problems, usually airway obstruction or respiratory arrest (as might occur with overly deep "conscious" sedation). The young child's heart is normally healthy. Coronary artery disease is essentially nonexistent in this age group. However, the healthy young heart will cease beating when deprived of oxygen for a prolonged period. At the moment a pediatric cardiac arrest occurs, there is no residual oxygen remaining in the victim's blood (all available oxygen has been utilized by the dying cells). Acidosis and cellular (biological) death develop rapidly. U.S. survival rates from out-of-hospital cardiac arrest in pediatric patients is from 3 percent to 17 percent, and survivors are often neurologically devastated.[5,6] By contrast, cardiac arrest in adults usually develops secondary to advanced coronary artery disease. At the moment the adult heart goes into arrest, there remains a reservoir of oxygen in the blood and tissues that will be utilized before cellular death occurs.

The very basic step of airway management (head tilt-chin lift) is critically important in saving the life of a child.

Pediatric Advanced Life Support

Because children are different from adults, the author recommends that the dentist and staff in offices where significant numbers of younger patients are treated successfully complete a course in pediatric advanced life support.[7]

Similar to BLS, PALS stresses basic and advanced life support techniques for younger patients. Offered through organizations such as hospitals, pediatric dental societies, and private educational providers, the course outline is presented in the **box on this page**.

PEDO

PEDO is the acronym for Pediatric Emergencies in the Dental Office, a didactic and clinical course in emergency medicine designed for the entire staff of the pediatric dental office. Sponsored by the American Academy of Pediatric Dentistry, the course provides in-depth, hands-on training in the prevention and management of specific emergency situations that arise more commonly in children.[a]

Emergency Team

The dental office emergency team consists of three individuals, each assigned specific tasks to perform, as outlined in **Table 1**.

All members of the office emergency team should be interchangeable. Although the proper and effective management of the emergency situation is ultimately the dentist's responsibility, emergency management may be performed by any trained individual under supervision of the dentist.

Access to Emergency Medical Services

Assistance in managing an emergency should be sought as soon as the treating doctor "feels" it is needed, and a "feeling" it is indeed. Emergency medical services should be sought if the dentist does not know what is happening; knows, but does not like, what is happening; or ever feels uncomfortable with the situation. The dentist should seek help as soon as possible in these situations.

In virtually all situations, the most practical course for getting help is to activate the EMS system by calling 911. In an emergency, the ultimate responsibility of the treating dentist is to keep the victim alive until he or she recovers or help arrives on scene to take over management of the situation. Though exceptions may exist, in most areas of California, EMS can be expected to arrive on scene within five to 10 minutes.

Box

Pediatric Advanced Life Support

Course Outline

- The Chain of Survival and Emergency Medical Services for Children*
- Basic Life Support for the PALS Health Care Provider*
- Airway, Ventilation, and Management of Respiratory Distress and Failure*
- Fluid Therapy and Medications for Shock and Cardiac Arrest
- Vascular Access*
- Rhythm Disturbances
- Postarrest Stabilization and Transport
- Trauma Resuscitation and Spinal Immobilization
- Children with Special Health Care Needs*
- Toxicology*
- Neonatal Resuscitation
- Rapid Sequence Intubation
- Sedation Issues for the PALS Provider*
- Coping with Death and Dying
- Ethical and Legal Aspects of CPR in Children*

**Denotes subjects of special interest to dentists treating children*

Table 1

Office emergency team

Team member	Responsibilities
Member #1 (first person on scene of emergency)	1. Remain with victim 2. Activate office emergency system 3. Basic life support as necessary
Member #2	1. Bring emergency equipment* to scene
Member #3 (and other members of the dental office staff)	1. Assist as necessary a. Activate emergency medical services b. Meet and escort EMS to office c. Assist with basic life support d. Prepare emergency drugs for administration e. Monitor and record vital signs

*Emergency equipment includes oxygen supply, emergency drugs, and, when appropriate, an automated external defibrillator

Emergency Drugs and Equipment

Every dental office must have emergency drugs and equipment, as listed in **Tables 2 through 4**. Minor modifications are necessary in offices where children are treated (colored rows in **Tables 2 and 4**).

In offices where central nervous system depressant drugs are employed for conscious sedation, antidotal drugs that are available for specific sedative agents must be included in the emergency drug kit (**Table 3**). If benzodiazepines are used (e.g., diazepam, midazolam, triazolam), flumazenil must be available. Where opioids are employed, naloxone must be included in the emergency drug kit. Single doses of these drugs may be ineffective when administered to manage overdosage resulting from orally administered or long-acting benzodiazepines and opioids.

Table 2

Recommended Dental Office Emergency Drugs

Drug	Indication	Availability	Recommended for kit
Epinephrine (Adrenalin)	Anaphylaxis	1:1000 (adult) (0.3 mg/dose)	1 preloaded syringe and 3 x 1 mL ampules of 1:1,000
Epinephrine (Adrenalin)	Anaphylaxis	1:2,000 (pediatric) (0.15 mg/dose)	1 preloaded syringe and 3 x 1 mL ampules of 1:1,000
Diphenhydramine (Benadryl)	Allergic reactions	50 mg/mL	2-3 x 1 mL ampules of 50 mg/mL
Oxygen	All emergencies	"E" cylinder + delivery devices	Minimum 1, preferable 2, "E" cylinders
Albuterol (Proventil, Ventolin)	Bronchospasm	Metered aerosol inhaler	1 aerosol inhaler
Sugar	Hypoglycemia	Orange juice, "insta-glucose"	12-ounce bottle of orange juice and/or 1 tube of "insta-glucose"
Aspirin	Suspected myocardial infarction	325 mg tablets	1-2 sealed tablets
Nitroglycerin	Angina pectoris	Metered spray	1 Nitrolingual pumpspray

Table 3

Antidotal Drugs

Drug	Indication	Availability	Recommended for kit
Flumazenil (Romazicon)	Benzodiazepine antagonist	0.1 mg/mL	1 x 10mL multidose vial
Naloxone (Nascan)	Opioid antagonist	0.4 mg/mL	2 x 1 mL ampule of 0.4 mg/mL

Basic Management

As described above, basic management of all medical emergencies follows the **PABCD** acronym, (positioning, airway, breathing, circulation, and definitive care [in the BLS acronym, D is defibrillation]).

It is first necessary to determine if the patient is conscious or unconscious. Unconsciousness is defined as the lack of response to sensory stimulation (e.g., lack of response to the "shake and shout" maneuver).[9]

Position

As the most common cause of loss of consciousness is hypotension, all unconscious patients are placed, at least initially, in a supine position with their feet elevated slightly. This position provides an increase in cerebral blood flow with a minimum of interference with respiratory efforts.[10] Conscious people experiencing a medical emergency are placed in whatever position they find most comfortable. As an example, most people in acute respiratory distress (e.g., acute asthmatic bronchospasm) automatically assume an upright position to improve ventilation.

Airway and Breathing

In the unconscious person, the head tilt-chin lift maneuver must be performed (**Figure 2**) followed by an assessment of ventilation ("look, listen, feel").

An important point to remember: Seeing the victim's chest moving does not guarantee that he or she is actually breathing (exchanging air), but simply that he or she is *trying* to breath. Hearing and feeling the exchange of air against the rescuers cheek is the only indication of successful ventilation.

In the absence of spontaneous respiratory efforts (e.g., chest not moving), controlled ventilation must be performed as expeditiously as possible. With

Table 4

Suggested Dental Office Emergency Equipment

Device	Availability	Recommended for kit
Automated external defibrillator	Many	1 AED (pediatric AEDs are available)[8]
Face masks	Various sizes for children and adults	Several pediatric masks and adult mask
Dispoable syringes and needles	2 mL syringe with 20-gauge needle	2-3 sterile, disposable syringes
Spacer for bronchodilator inhaler	Various manufacturers	1 "spacer"

a full face mask and positive pressure oxygen, the patient older than 8 is ventilated at a rate of one breath every five seconds, whereas a rate of one breath every three seconds is used for the infant and child victim.[11] Each individual ventilation should cease when the chest is seen to rise, as overventilation leads to gastric distension and regurgitation.

Circulation

In pediatric medical emergencies, it is likely that a palpable pulse will be present, especially in situations in which the airway and breathing are adequately and rapidly assessed and supported.

Remember: Airway problems (e.g., obstruction, apnea) are the most common cause of cardiac arrest in infants and children.

Palpation of the carotid artery pulse is preferred in children 1 year or older and adults, whereas the brachial pulse is preferred in infants younger than 1 year. In the absence of a palpable pulse, chest compression must be commenced, and EMS summoned immediately.

Definitive Care

Following assessment and implementation of the required steps of BLS, the dentist must seek to determine the cause of the problem (i.e., make a diagnosis). Where a diagnosis is possible and appropriate treatment available, it should be undertaken. If a diagnosis is made but appropriate treatment is not available or if the cause of the problem remains unknown, EMS should be sought immediately. Definitive management of several common pediatric emergencies follows.

Specific Emergencies

Acute Bronchospasm (Asthmatic Attack)

Recognition: Conscious patient in acute respiratory distress, demonstrating wheezing, supraclavicular and intercostal retraction.

P: Position comfortably — usually upright

A, B, C: Assessed as adequate (Victim is conscious and able to speak.)

D: (1) Administer bronchodilator. If patient's inhaler is available, allow him or her to use it. If the patient is younger and the parent or guardian is available, bring him or her into the treatment room to assist in administration of bronchodilator. Many younger children require the use of a spacer to obtain adequate relief with the inhaler.

(2) Administer oxygen, via facemask or nasal canula at a flow rate of 3 to 5 liters per minute.

(3) Summon EMS if parent or guardian of the patient suggests it, or if the episode of bronchospasm does not terminate following two adequate doses of the bronchodilator.

Generalized Tonic-Clonic Seizure ("Grand Mal" Seizure)

Recognition: Period of muscle rigidity (about 20 seconds) followed by alternating muscle contraction and relaxation lasting for about one to two minutes.

P: Position supine.

A, B, C: Assessed as adequate (respiratory and cardiovascular stimulation usually occur during seizure).

D: (1) Protect victim from injury. Keep victim in the dental chair; gently hold onto arms and legs, preventing uncontrolled movements, but do not hold so tight as to prevent limited movement.

(2) If parent or guardian is available, bring him or her into the treatment room to assist in assessment of victim.

(3) Summon EMS if parent or guardian of patient suggests it, or if the seizure continues for more than two minutes.

Remember: Do not place anything between the teeth of a convulsing person.

Most generalized tonic-clonic seizures will stop within one minute and almost always within two minutes (thus the recommendation to seek EMS with prolonged seizure activity). At the termination of the seizure, P, A, B, C, D must be reassessed, as follows:

P: Position supine.

A, B, C: Assessed and managed as needed. In most (but not all) post-seizure situations, **A** must be managed, but **B** and **C** are assessed as adequate.

D: With help from the parent or guardian, try to communicate with the patient, who is likely in a state similar to a deep physiologic sleep. Following a generalized tonic-clonic seizure, the

victim is quite disoriented. As the parent or guardian has seen this and done this before, allow him or her to talk with the patient to reorient the patient to both space and time.

Remember: Most morbidity and mortality associated with seizures occurs in the postseizure period because the rescuer does not do enough for the victim (P, A, B, C)

Sedation Overdose

Recognition: Lack of response to sensory stimulation.

Consider. An overdose of sedation is general anesthesia. Effective management of a patient receiving general anesthesia is predicated on airway management and breathing. Therefore, this should not represent an emergency in the office of a doctor who is trained to administer general anesthesia to children or adults.

P: Position supine.

A, B, C: Assessed and managed as necessary. In most cases, **A** alone is required; whereas **A** and **B** will be needed in a few situations. **C** will generally be present if **A** and **B** are properly assessed and managed.

D: (1) Monitor patient, using pulse oximeter[b] (and blood pressure and heart rate/rhythm).

(2) Stimulate patient periodically (verbally and/or squeezing the trapezius muscle) seeking response.

3) Antidotal therapy: If sedative drugs were administered parenterally, and intravenous access is available, administer flumazenil IV in a dose of 0.2 mg (2 mL) in 15 seconds waiting 45 seconds to evaluate recovery where benzodiazepines were administered. If recovery is not adequate at one minute, an additional dose of 0.2 mg may be administered. Repeat every minute until recovery occurs or a dose of 1.0 mg has been delivered. Titrate naloxone IV at 0.1 mg. (0.25 mL) per minute to a dose of 1.0 mg if an opioid was administered. Naloxone may be administered intramuscularly, in a dosage of 0.01 mg/kg every two to three minutes until the patient is responsive.

Remember: Specific antidotal therapy may not be effective following the oral administration of central nervous system depressants; and antidotal therapy should be administered intravenously, if possible. Naloxone may be administered intramuscularly.

> Basic life support (as necessary) is all that is required to manage many emergency situations, with the addition of specific drug therapy in some others.

Local Anesthetic Overdose

A true overdose of local anesthetic should be always preventable.[2]

Recognition. Generalized tonic-clonic seizure or unconsciousness, generally developing five to 40 minutes after local anesthetic administration.

P: Position supine.

A, B, C: Assessed and administered as needed.

D: (1) Generalized tonic-clonic seizure — follow protocol for seizures (above). With proper airway management and ventilation, a local anesthetic-induced seizure often ceases in less than one minute. In the absence of an adequate airway and ventilation, carbon dioxide is retained, the patient becomes acidotic, and the seizure threshold of the local anesthetic decreases, leading to more prolonged and more intense seizure.[13]

(2) Unconsciousness — the basic protocol for management of the unconscious patient is followed when a local anesthetic overdose manifests itself as loss of consciousness. Proper management of airway and breathing, as needed, will minimize occurrence of cardiac arrest. As the cerebral concentration of the local anesthetic decreases (through redistribution of the drug out of the brain) consciousness returns.

(3) Summon EMS if consciousness is not restored in two minutes or if the patient is not breathing.

Final comments

Medical emergencies can and do occur in the practice of dentistry. Although most emergencies take place in adults, serious problems can also develop in younger patients. The contemporary dentist must be prepared to manage expeditiously and effectively those few problems that do arise. Basic life support (as necessary) is all that is required to manage many emergency situations, with the addition of specific drug therapy in some others. Preparation of the office and staff includes basic life support (annually), pediatric advanced life support, development of an emergency team, consideration for emergency medical services, and the availability of emergency drugs and equipment with the ability to use these items effectively. As with the adult patient, effective management of pain (local anesthesia) and anxiety (behavioral management, conscious sedation) will minimize the development of medical emergencies. CDA

Notes / a. PEDO — contact the American Academy of Pediatric Dentistry for dates of future PEDO courses. www.aapd.org, 800.544.2174.

b. The doctor using oral sedation (in children younger than 13) or parenteral (intramuscular or intravenous) sedation must have a pulse oximeter in the dental office, as per the Dental Practice Act, Part 3, California Code of Regulations.

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This article continues the theme of the September 2003 *Journal*: Managing Medical and Behavioral Changes in Children.

Serum Mepivacaine Concentrations After Intraoral Injection in Young Children

Katherine L. Chin, DDS, MS; John A. Yagiela, DDS, PhD; Christine L. Quinn, DDS, MS; Kent R. Henderson, DDS; and Donald F. Duperon, DDS, MS

ABSTRACT

The authors measured plasma concentrations of mepivacaine in 36 children from the ages of 2 to 5 years who received dental care under light general anesthesia. The subjects were randomly assigned to receive either 2 percent mepivacaine hydrochloride with 1:20,000 levonordefrin or 3 percent mepivacaine hydrochloride without vasoconstrictor. The volume of anesthetic injected depended on the planned procedures for each patient. Blood samples (3 mL) were drawn from an intravenous line before and 5, 10, 20, 30, 45, and 60 minutes after mepivacaine injection. The serum was collected and analyzed by gas-liquid chromatography. Mean serum concentrations, normalized to a dose of 1 mg/kg body weight, reached a peak of 0.67 ± 0.42 µg/mL (mean ± SD) after 3 percent mepivacaine and 0.63 ± 0.21 µg/mL after 2 percent mepivacaine with levonordefrin. Levonordefrin had no significant effect on the plasma concentrations. However, because of the higher concentration of mepivacaine in the 3 percent formulation, it was potentially 1.5 times as toxic ($P<0.002$) on a volume basis. Statistical analysis also suggested that the maximum recommended dose of 3 mg/lb could result in potentially toxic blood concentrations in a small percentage of pediatric patients. The authors conclude that 3 percent mepivacaine should not be used when relatively large volumes of local anesthetic must be administered to small children and recommend that the maximum dose of mepivacaine not exceed 5 mg/kg.

Mepivacaine (Carbocaine, Polocaine, Scandonest, etc.), introduced clinically in 1955, is widely used by dentists for intraoral anesthesia. As a 2 percent hydrochloride solution with 1:20,000 levonordefrin, mepivacaine is similar in onset, duration, efficacy, and safety to the more commonly used formulation of 2 percent lidocaine HCl with 1:100,000 epinephrine.[1-3] As a 3 percent HCl solution without vasoconstrictor, mepivacaine combines high efficacy with a relatively short duration of pulpal anesthesia, at least after maxillary supraperiosteal injection.[4] The 3 percent formulation is often preferred by general dentists for use in young children, presumably because of a per-

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ceived reduced risk of postoperative lip, tongue, and cheek biting.[5,6]

Significant toxic reactions, including fatalities, have been reported in children given 3 percent mepivacaine.[7-9] Early signs of toxicity, usually excitatory in nature, develop in humans when the plasma concentration exceeds 5 µg/mL.[10] Seizures may occur when plasma concentrations reach 6 to 10 µg/mL.[11] A massive overdose can result in respiratory and cardiac arrest. One such report described a 16.4-kg, 5-year-old patient receiving an unknown concentration of nitrous oxide who was administered five cartridges (9 mL) of 3 percent mepivacaine in less than five minutes.[7] The patient began seizing shortly thereafter and suffered cardiopulmonary arrest. The child was resuscitated but died four days later from anoxic brain injury secondary to cardiopulmonary arrest.

Clinicians depend on maximum dosage guidelines for determining safe quantities of local anesthetic for their patients. For mepivacaine, the maximum recommended dosage is 6.6 mg/kg, or 3 mg/lb, up to a total dose of 400 mg.[12] Unfortunately, with no published data on blood concentrations of mepivacaine after intraoral injection in young children, it is not firmly established if these recommendations are appropriate. An additional concern regarding safety in children is that general dentists are more likely to exceed maximum recommended dosages of local anesthetic in patients weighing less than 20 kg.[6] Finally, a nationwide survey of pediatric dentists revealed that only half of these practitioners used exact body weight to determine anesthetic dosage.[13]

In this study, the authors determined the serum concentrations of mepivacaine in young children when the local anesthetic was administered as a 3 percent solution without vasoconstrictor or as a 2 percent solution with 1:20,000 levonordefrin. The study's purpose was to help verify maximum dosage limits for mepivacaine in children and ultimately increase the safety of local anesthetics in dentistry.

Methods

This study, approved by the UCLA Human Subjects Protection Committee, enrolled 36 healthy children from the ages of 2 to 5 years who were scheduled to receive full-mouth rehabilitation under light general anesthesia at the University of California at Los Angeles Pediatric Dental Clinic. After parental informed consent was obtained for acquiring blood samples, the following characteristics were recorded for each patient: weight, sex, age, and ethnicity. Deep sedation was then introduced with an intramuscular injection of 2.5 mg/kg ketamine HCl (Ketalar), 0.1 mg/kg midazolam HCl (Versed), and 6 to 8 µg/kg glycopyrrolate (Robinul). Intravenous access was obtained with a 20-gauge catheter (Angiocath) once the child was sedated. Light general anesthesia was maintained with propofol (Diprivan) infused as needed.

With no published data on blood concentrations of mepivacaine after intraoral injection in young children, it is not firmly established if these recommendations are appropriate.

Each patient was randomly assigned before treatment to receive intraoral injection of either 2 percent mepivacaine HCl with 1:20,000 levonordefrin (Polocaine with Levonordefrin) or 3 percent mepivacaine HCL (Polocaine). The operator was informed of the manufacturer's recommended maximum dose of mepivacaine (3 mg/lb) and of the randomly assigned formulation to be administered to the patient. The volume of anesthetic injected depended on the planned procedures as determined by the operator. All mepivacaine injections were given at the beginning of treatment over a three-minute period using preweighed cartridges. Two percent lidocaine HCl with 1:100,000 epinephrine (Xylocaine with epinephrine) was used if additional local anesthetic was needed intraoperatively. All dispensed mepivacaine anesthetic cartridges were retrieved immediately after treatment. Used cartridges were weighed to determine the injected dose.

Blood samples (3 mL) were drawn before and at 5, 10, 20, 30, 45, and 60 minutes after mepivacaine injection. If the dental treatment was finished before 60 minutes, blood collection ceased when the IV line was removed during the recovery period. The blood samples were drawn through the IV line, which was equipped with a stopcock. Saline dilution was minimized by turning off the IV drip approximately 15 seconds before blood sampling and then withdrawing 3 mL of blood before obtaining each sample.

The blood was allowed to clot and then centrifuged at 2000 g for 10 minutes. The serum was collected and stored at -20 degrees Celsius for subsequent analysis. The serum concentra-

tions of mepivacaine were determined by gas chromatography essentially according to the method of Zylber-Katz and colleagues.[14]

Mepivacaine was extracted into 3 mL of n-hexane from 0.5-mL serum samples diluted with 0.5 mL of triple distilled water to which 0.1 mL of 4 N NaOH was added to convert the local anesthetic to the free base form. Cyclizine (1 µg) was also added as an internal standard. The samples were gently shaken (one minute) and centrifuged (2000 g, 10 minutes). The top organic phase was removed and gently shaken (one minute) with 0.5 mL 4 N HCl and centrifuged again (2000 g, five minutes). The samples were stored in tightly capped centrifuge tubes in an ice bath for injection into the gas chromatograph. All chemicals were obtained from Sigma (St. Louis, Mo.).

For drug measurement, 1 µL of the lower aqueous phase was withdrawn with a 10-µL microsyringe (Hewlett Packard, Co., Palo Alto, Calif.) and injected into a gas chromatograph (Hewlett Packard Model 6890). A 30-m (0.32-mm inner diameter, 0.25-µm film thickness) cross-linked 5 percent-diphylene-95 percent-dimethylsiloxane copolymer capillary column (Hewlett Packard Model HP-5) was used. The oven was programmed to escalate in temperature from 75 degrees Celsius to 175 degrees Celsius at a rate of 50° C/min, with a hold time of 1 minute at 175 degrees Celsius, and from 175 degrees Celsius to 250 degrees Celsius at a rate of 25° C/min, with a hold time of 2.5 minutes at the final temperature. Helium was the carrier gas. The temperatures of the injection port and detector were 310 degrees Celsius and 325 degrees Celsius, respectively. Peak areas were recorded as measured by the HP 6890 Series

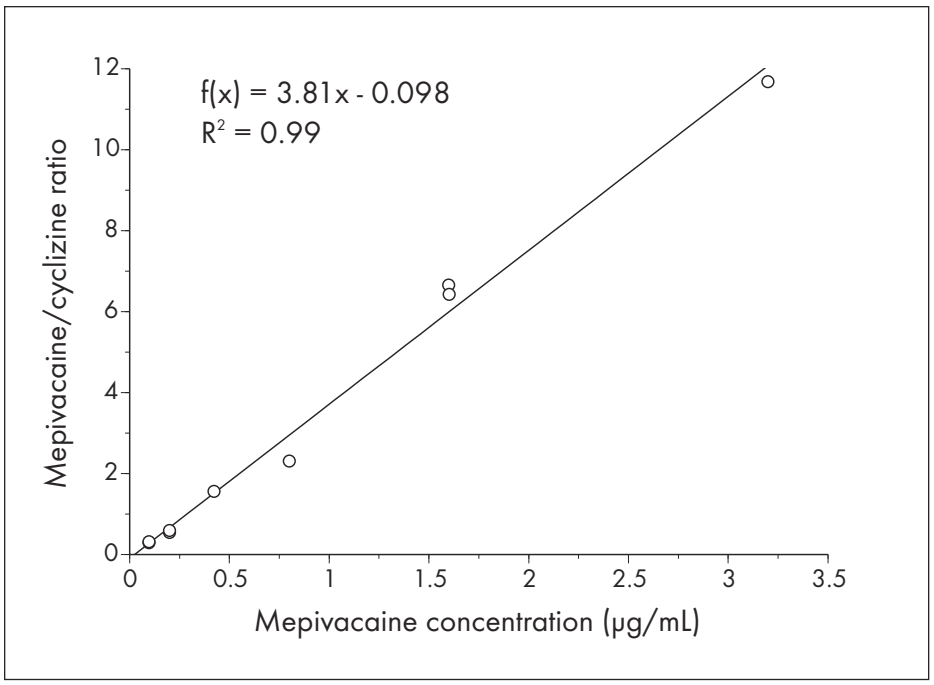

Figure 1. Standard mepivacaine analysis curve prepared by adding cyclizine (1 µg) and mepivacaine (0-1.6 µg) to drug-free serum samples.

Integrator. Each measurement was made in triplicate, with the mean value used for analysis.

Drug-free serum was analyzed to determine that no extraneous peaks were detected that could possibly interfere with the mepivacaine and cyclizine peaks. To ensure that peaks from the other therapeutic agents used would not interfere with those of mepivacaine and cyclizine, ketamine, midazolam, propofol, and lidocaine with epinephrine were added to drug-free serum and analyzed. Standard curves were constructed from controls containing 0, 0.1, 0.2, 0.4, 0.8, and 1.6 µg mepivacaine added to the drug-free serum to permit calculation of unknown mepivacaine concentrations (**Figure 1**).

An analysis of variance with repeated measures was used to compare the serum concentrations of mepivacaine for the two drug treatments over time. Student's t-test was used to compare patient characteristics, mepivacaine dosages and volumes, peak serum concentrations, and times to peak concentration. Linear regression forced through the origin was used to correlate the injected dose with the peak concentration of mepivacaine. All statistical analyses were performed using Systat, version 5.2 for Macintosh (SPSS, Inc., Chicago).

Results

The results of one subject could not be used because of a failure to record the body weight. Descriptive data from the remaining 35 subjects, as listed in Table 1, demonstrate that the randomization method resulted in two similar test groups. Overall, the body weight ranged from 11 to 24 kg, with a mean (± SD) weight of 17.3 ± 4.3 kg. The age of the subjects ranged from 25 to 67 months, with a mean age of 47 ± 12 months. The study population was ethnically diverse, including 46 percent Hispanic, 43 percent Caucasian, and 11 percent African-American children. No toxic reactions to the local anesthetic were observed, nor were there any adverse effects from the dental treatments or anesthetic agents.

The sedative and anesthetic agents did not interfere with mepivacaine measurements in our study, which is in accordance with the findings of others.[15] In addition, there was no independent effect of age or race on the results.

Figure 2 illustrates the injected dose of mepivacaine for the each study patient. The mean injected dose for 3 percent mepivacaine was 4.42 ± 1.38 mg/kg. This value was almost exactly 50 percent (49.3 percent) higher than the 2.96 ± 1.13 mg/kg mean for 2 percent mepivacaine with levonordefrin. This difference indicates that the injected volumes for the two anesthetic formulations were essentially identical.

Figure 3 shows the mean serum mepivacaine concentrations versus time after local anesthetic injection for 31 subjects. (Data from four subjects were lost during sample preparation. Only insignificant changes would have resulted from their exclusion in **Table 1** and the mean dosing data.) The values are normalized to an injection dose of 1 mg/kg. The 3 percent formulation resulted in slightly higher mean serum concentrations from 10 to 45 minutes after injection. These differences were not statistically significant overall or at any time period. The normalized peak serum concentration was reached with both formulations at 30 minutes. The normalized mean peak concentration without respect to time (not shown in Figure 3) was 8 percent higher in the 3 percent mepivacaine group (0.67 ±

0.42 µg/mL versus 0.63 ± 0.21 µg/mL). All of the differences between the two formulations could be attributed to a single subject whose concentrations were more than three standard deviations above the mean. Excluding this subject would result in a mean of 0.58 ± 0.18 µg/mL for the peak mepivacaine concentration in the 3 percent mepivacaine group.

The peak serum concentration for each patient is plotted in **Figure 4** as a function of the injected dose. Because there was no significant difference between the normalized peak serum concentrations for the two formulations, data for the two test groups were combined. The outlier (indicated by an asterisk) was omitted from the linear regression calculation based on the assumption that some of the drug was injected intravascularly or a mistake occurred in recording the injected volume of anesthetic.

Table 1

Subject Data by Treatment Group

	3% mepivacaine	2% mepivacaine + levonordefrin
Age (mo)	47 ± 13*	47 ± 12*
Weight (kg)	16.7 ± 3.7*	18.1 ± 5.0*
Race (His/Cauc/Af-Am)	8/9/3†	

*Mean ± SD
†Numbers of Hispanic/Caucasian/African-American children enrolled

Discussion

The mean peak serum concentrations described here for children are similar to those reported previously by Goebel and colleagues for adults after intraoral injection (0.69 µg/mL for 3

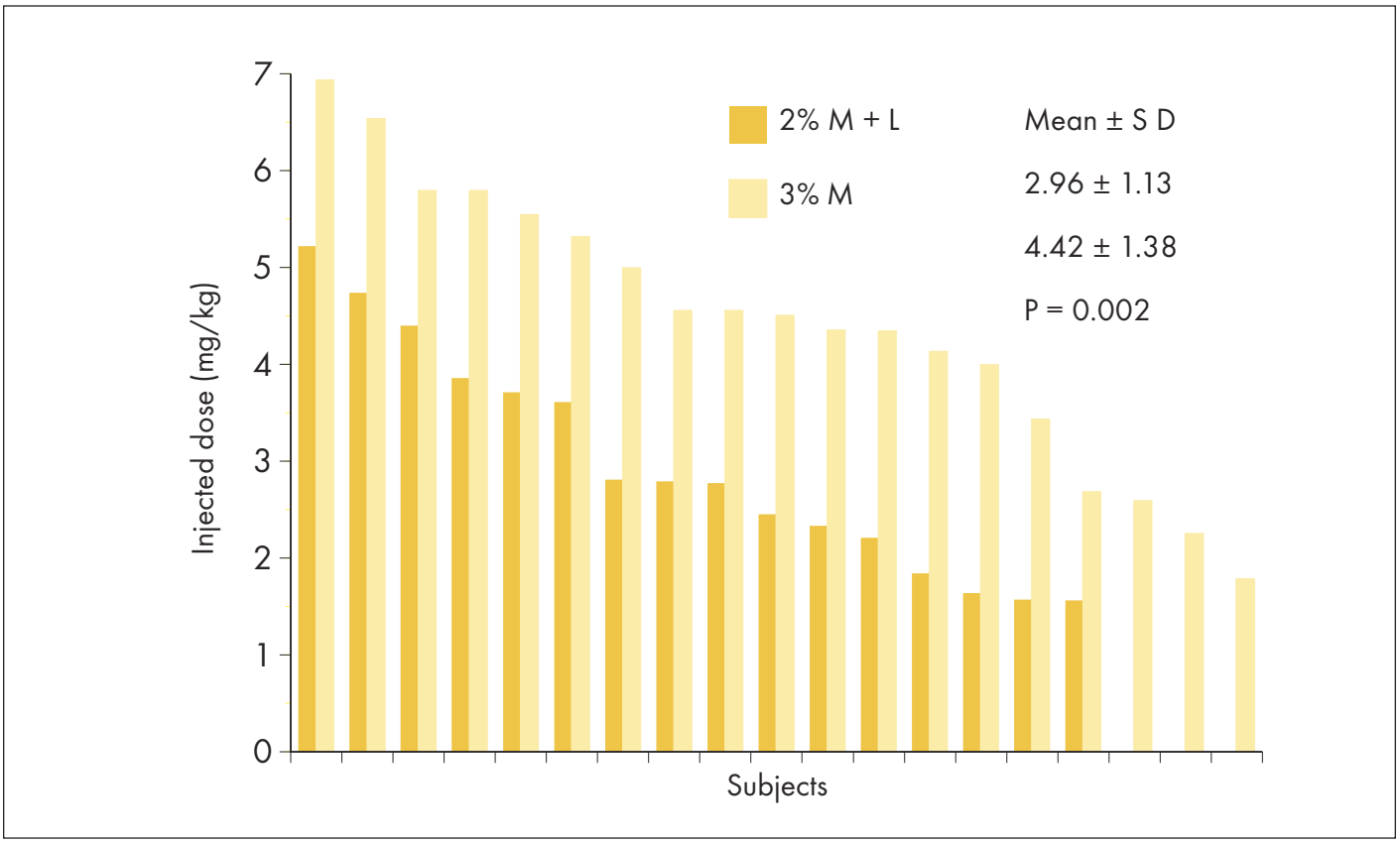

Figure 2. Injected dose of mepivacaine by body weight. Each bar represents a single subject.

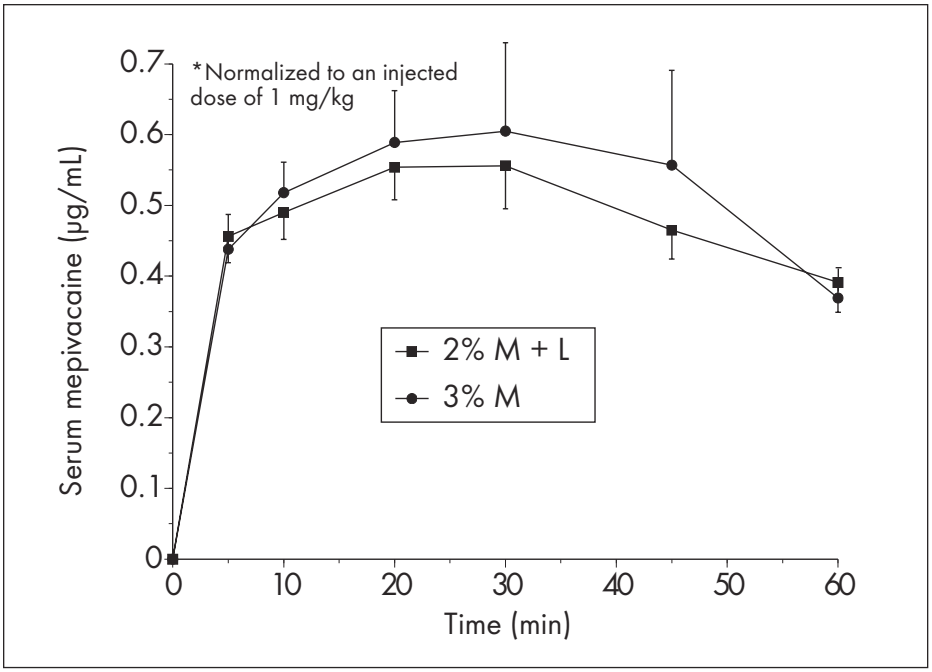

Figure 3. Serum mepivacaine concentrations normalized to an injected dose of 1 mg/kg. Bars indicate the standard errors. M = mepivacaine; L = levonordefrin

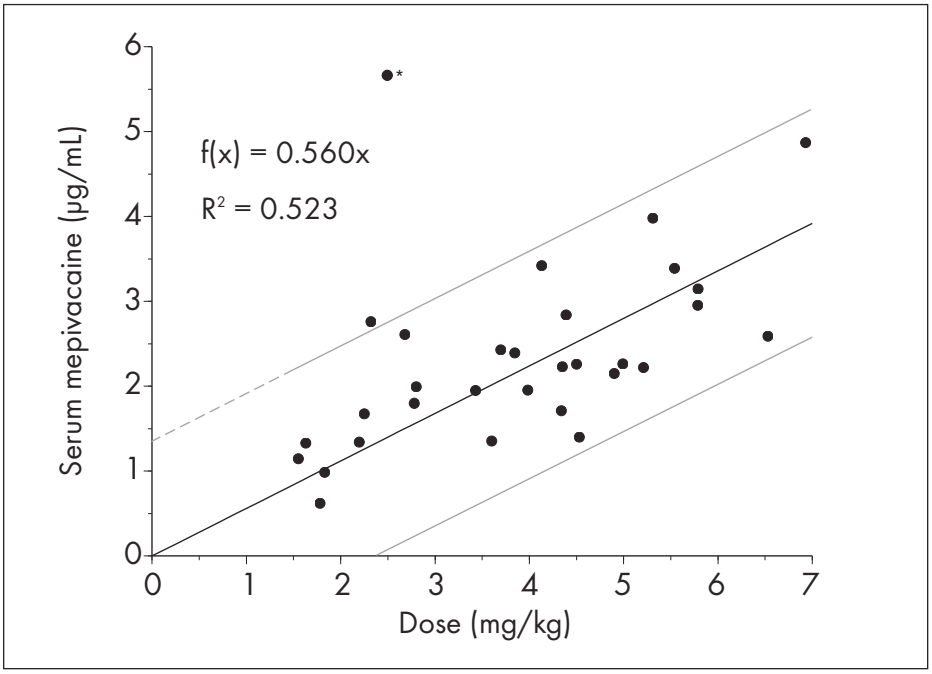

Figure 4. Linear regression of the pooled peak serum concentrations. Each point represents a single subject. A single outlier, not used in the regression analysis, is indicated by an asterisk (*). The 95 percent prediction limits are indicated by lines above and below the regression line

percent mepivacaine and 0.62 µg/mL for 2 percent mepivacaine with 1:20,000 levonordefrin when normalized to a 1 mg/kg injected dose of mepivacaine).[16,17] As with this study, they found no significant influence of levonordefrin on peak mepivacaine concentrations, which also occurred 30 minutes after injection.

The regression equation shown in **Figure 4** indicates that a dose of 1 mg/kg will, on average, result in a peak serum concentration of 0.56 µg/mL. For a maximum recommended dose of 6.6 mg/kg (3 mg/lb), this relationship would yield a mean concentration of 3.7 µg/mL, a relatively high but safe value. However, the 95 percent prediction limits for the regression equation indicate that 2.5 percent of children would achieve a peak serum concentration of at least 5 µg/mL, the maximum "safe" concentration. Using the pooled mean of 0.60 µg/mL calculated from the measured peak serum concentrations normalized to an injection dose of 1 mg/kg, and the pooled standard deviation of 0.19 µg/mL (both values excluding the outlier), the authors can also estimate that 2.5 percent of the population would have a serum concentration of at least 5 µg/mL at an injection dose of only 5.1 mg/kg. These two methods of estimation use different statistical assumptions. Regression analysis assumes that the residual errors are normally distributed, whereas the normalized data calculation assumes that the serum concentrations themselves are normally distributed once they have been normalized to an injection dose of 1 mg/kg. Although the assumption underlying the linear regression has a slightly better fit with the data, neither assumption could be rejected at the $P = 0.1$ level of confidence; and

caution dictates using the more conservative estimate of risk. Therefore, to ensure that the vast majority of patients will have a peak serum concentration below 5 µg/mL, the injected dose should not exceed 5 mg/kg.

The single outlier in this study deserves special comment. Although a laboratory error of some kind could have occurred, the fact that the subject's mepivacaine concentration was high at all times after baseline and that other samples assayed at the same time were within normal limits suggests that the measurements were accurate. A possible mistake more consistent with the measured data is that the injected dose was underestimated because one or more used cartridges were either not weighed accurately or not weighed at all. Subsequent review of the patient's chart, however, revealed no evidence in support of a larger dose being given. It is also possible that some of the drug was injected intravascularly by mistake. A misadventure of this kind should normally have resulted in a high peak serum concentration occurring almost immediately after injection. Since the first sample was taken five minutes after injection, there may have been sufficient time for the drug to be distributed such that the five-minute value was not high compared to later measurements. A final, disturbing possibility is that the outlier represents a truly idiopathic response to injected mepivacaine. Other investigators have also reported individual subjects with unusually high serum concentrations of mepivacaine.[18,19] As in this study, no adverse event occurred despite these "toxic" values.

Local anesthetics are often not administered according to concentration or dose but rather according to the volumes normally used for particular injection techniques. For example, when administering an inferior alveolar nerve block, many dentists will inject one cartridge regardless of the type or strength of anesthetic used or even the size of the patient.[6] These tendencies compound the risk of local anesthetic overdose when 3 percent mepivacaine is used in lieu of a 2 percent local anesthetic formulation with vasoconstrictor simply because 50 percent more local anesthetic is given. Young children with low body weights are at special risk for receiving relatively large amounts of local anesthetic. Since the primary reason dentists cite for selecting 3 percent mepivacaine over less concentrated local anesthetics — that being reduced cheek, lip, and tongue biting — is debatable and unproved, the increased toxic potential of the formulation should limit its routine use.[5]

The fact that the subject's mepivacaine concentration was high at all times after baseline and that other samples assayed at the same time were within normal limits suggests that the measurements were accurate.

Finally, accidental intravascular injection of the local anesthetic must be considered. In dentistry, the use of local anesthetic cartridges with a limited volume of solution greatly reduces this risk in adults. But very small children are not protected by this volume limitation because the content of one cartridge may be sufficient to cause systemic toxicity. One way to avoid intravascular deposition of local anesthetics is to limit the use of nerve blocks and use supraperiosteal injections whenever possible. Several reports have shown that infiltration in the pediatric mandible is as effective as the inferior alveolar nerve block when simple dental procedures are performed.[20,21]

Conclusion

Because levonordefrin does not significantly affect the peak serum concentration of mepivacaine after intraoral injection, the 3 percent formulation is potentially 1.5 times as toxic as the 2 percent formulation when given in the same volume. Therefore, the authors believe that 3 percent mepivacaine should not be used when relatively large volumes of local anesthetic must be administered to small children and that the dosage of mepivacaine with or without vasoconstrictor should not exceed 5 mg/kg. CDA

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A Predictable Precision Cast for Multi-Unit Screw-Retained Implant Prosthesis: Rationale and Technique

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

ABSTRACT

The aim of this article is to describe a technique derived from the premachined cylinder luting technique with the goal to predictably fabricate a highly precise master cast. An impression can be taken directly at implant level or, with some technique modification, at the abutment level. Concurrently, multiple techniques can be employed to fabricate the final framework with the assurance that a framework that fits the cast will fit in the mouth. This predictability improves the workflow of the restoring dentist and laboratory technician since multiple framework try-ins and adjustments are eliminated.

From the early years of implant dentistry, it was recognized that if implants were to be connected it was to be done in a passive, nonstress-inducing manner.[1-3] Recent literature suggests a wide variation in biological tolerances in relation to the detrimental effects from static loading, as would be created by ill-fitting framework-to-implant connections.[4-7] The gold screw to the abutment in the Brånemark system creates a clamping force of 300 N.[8] When the fit is incorrect, some of these forces will be transferred as axial and torque forces into the prosthetic components and the bone implant interface. In vivo research[9-11] confirms the introduction of considerable stresses when implants are connected using traditional prosthetic techniques.

The induction of unfavorable stress in the implant-suprastructure connection may be responsible for loss of osseointegration and failure of prosthetic components.[12-14] Discrepancies are inherent in the different stages of any framework production, due to different material and technique characteristics. This has led authors to question the feasibility of attaining a completely passive implant and suprastructure connection using conventional techniques.[15-17] Potential discrepancies between the oral situation and the master cast can be associated with impression techniques,[18-22] repositioning techniques,[23] and stone expansion.[24-26]

In trying to improve definitive precision, one of the techniques that has been developed is the concept of intraorally luting premachined cylinders to the metal implant framework. Multiple variations of this technique have been described,[27-29] all aiming at



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creating a passively fitting framework. Improved fit compared to the result of conventional techniques has been confirmed by different authors.[30-32]

The aim of this article is to describe a technique derived from the premachined cylinder luting technique with the goal to predictably fabricate a highly precise master cast. An impression can be taken directly at implant level or, with some technique modification, at the abutment level. Concurrently, multiple techniques can be employed to fabricate the final framework with the assurance that a framework that fits the cast will fit in the mouth. This predictability improves the workflow of the restoring dentist and laboratory technician since multiple framework try-ins and adjustments are eliminated.

Technique

1. Tighten implant level transfer impression copings (Nobel Biocare, Goteborg, Sweden) after confirming complete seating with radiographs.

2. Capture relationship of impression posts and soft tissue with polyvinyl impression material (Extrude Extra, Kerr, Romulus, Mich.) in a stock tray (Coetray, GC America, Alsip, Ill.).

3. Connect implant level analogs to impression copings (Nobel Biocare, Goteborg, Sweden). Inject gingival mask (Henry Schein, Inc., Melville, N.Y.), and form cast in stone (Tuff Rock Formula 44, Talladium Inc., Valencia, Calif.).

4. Use this primary cast, after mounting, for the conventional prosthetic workup. The resulting implant-supported trial setup is connected with two nonhexed temporary cylinders (Attachments International, Inc., San Mateo, Calif.). The first cylinder is connected on the primary cast to the try-in base. The second cylinder is connected intraorally with Triad gel (Dentsply International, Inc., York, Pa.) to the acrylic resin base.

5. Modify impression copings (Nobel Biocare, Goteborg, Sweden) by removing the hexagonal elements on the internal aspects of these copings. This will eliminate any locking onto the external hex of the implants. The external aspects of the copings are air abraded with 50 µm of aluminum oxide. This will enhance the future bonding between the luting composite and the metal. Connect the modified copings to the implant analogs.

6. A uniform spacer is created with help of a 3/16-x-1/8-inch vinyl tubing.

Multiple techniques can be employed to fabricate the final framework with the assurance that a framework that fits the cast will fit in the mouth.

The modified impression coping is heated over a Bunsen burner, pushed into the tubing, and cut to the desired height. The approximate spacer thickness is 0.5 mm.

7. Fabricate a rigid pattern by connecting the impression copings together with GC resin (GC America Inc., Alsip, Ill.). The connecting areas are approximately 3 mm in diameter. For easy removal and separating between vinyl and resin, a fine film of petroleum jelly is applied. After hardening of the acrylic, unscrew the impression copings, then remove the assembly from the primary cast, and push the copings and the vinyl spacers out of the framework.

8. Cast this wax framework in Chrome Cobalt (Jelenko JP, Jelenko, Armonk, N.Y.). Reposition the cast framework onto the impression copings on the primary cast. The framework shows a uniform space of approximately 0.5 mm circumferentially around the titanium cylinders. This space will eventually be filled with composite resin.

9. Intraoral isolation is accomplished with a rubber dam and cheek retractors. A sheet of rubber dam (Hygenic Dental Dam, Coltene/Whaledent, Inc., Mahwah, N.J.) is placed over the impression copings on the primary cast, marked, and perforated with a rubber dam punch. This rubber dam is placed over the copings intraorally. When a more rigid setup is required, a reinforced rubber dam can be fabricated by placing a sheet of ethylene vinyl acetate material over the copings on the primary cast. The copings are marked and perforated with a lab bur to a dimension of approximately 8 mm. The outer dimensions of the cast are transferred to the EVA sheet. The EVA sheet is cut with scissors according to this line. Multipurpose adhesive (Super 77, 3M, St. Paul, Minn.) is sprayed over this EVA sheet, and a sheet of rubber dam is placed over it. Once the glue has dried, the extending part of the rubber dam is removed. This EVA/rubber dam sandwich is placed over the copings on the primary cast. The copings are marked, and these markings are perforated with a rubber dam punch.

10. Remove the intraoral healing caps, and place the modified impression copings onto the implants. As the hexagonal mating part has been removed, the copings will seat with-

out binding onto the implant flange. Tighten the copings and place the rubber dam over the copings. Fit the cast framework — this should be nonbinding and passive — with some residual spacing between the bar and the copings. One will find that this spacing now can be less uniform then on the primary cast, indicating discrepancies between this cast and the intraoral situation.

11. Clean the surface of the impression coping with alcohol and dry completely. Exercise care as not to contaminate the metal surfaces with saliva. Mix Panavia F (Kuraray America, New York, N.Y.), a dual polymerizing phosphate-modified luting composite resin with high bond strength to metals;[33,34] and place in a needle tube syringe (Centrix, Shelton, Conn.). Position the framework over all the cylinders and hold in position as to create the best distribution of the available space between all cylinders and the intaglio of the framework. On the primary cast, this space was an even 0.5 mm; intraorally the distribution is most often different. Now inject the Panavia F between the cylinder and the framework, stabilize the framework so it is fitting passively, then initiate polymerization of the luting composite resin with a curing light (Demetron 500, Kerr, Romulus, Mich.). As the light will only have access to the peripheral composite resin, the assembly is left in place for 10 minutes to complete the chemical polymerization step of the composite resin. At this time, the exact relative three-dimensional positions of all the implant platforms is now recorded.

12. The next step is to relate the implant position to the soft tissue. Remove the rubber dam from the bonded assembly by cutting it away. Create access in a stock tray so all the lab screws protrude trough it. A polyvinyl siloxane material is used for the impression (Extrude extra, Kerr, Romulus, Ill.) — low viscosity is injected around the framework and high viscosity in the tray. Position the tray so that all the screws are accessible. Upon setting of the impression material, loosen the screws. The luted frame assembly is embedded within

the pick-up impression.

13. Position new implant analogs onto the cylinders of the framework. The analogs have a hexagonal top, whereas the cylinders do not. The position of the hexagon is inconsequential, as the definitive framework will not have the mating internal hexagon. Tighten the analogs with similar tightness to the cylinders to the implant platforms. Soft-tissue mask material (Gingival Mask, Henry Schein, Inc. Melville, N.Y.) is injected into the impression. After setting, minimal expansion stone (Tuff Rock Formula 44, Talladium Inc., Valencia, Calif.) is poured into the impression. The authors' hypothesis is that any expansion of the stone will be of diminished consequences as far as implant position is concerned. Since the assembly is massive and rigid, it will resist the expanding stone from displacing the analogs. This is in contrast to a similar assembly made in acrylic resin where the expanding forces can bend the acrylic resin assembly, thus creating inaccuracies.

14. Dental stone undergoes a delayed linear expansion,[35] therefore the cast is left undisturbed for 72 hours. Upon setting, the screws are

Figure 1. The primary cast with impression copings.

Figure 2. The EVA sheet is adapted to the copings and will function as a carrier for the rubber dam.

Figure 3. The modified impression coping. The hexagonal component has been milled out.

Figure 4. The modified impression copings are connected to the implants.

Figure 5. The reinforced rubber dam is placed.

Figure 6. Bird's eye view showing the spacing between the bar and the copings.

Figure 7. Buccal view — the bar is fitting passively.

Figure 8. Panavia F is injected in the space between the bar and the copings

Figure 9. The bar is stabilized, and photo polymerization is initiated.

loosened and the impression separated from the cast. The precision cast is trimmed on a dry trimmer and is then ready for the manufacturing of the final framework for the multi-unit screw-retained implant prosthesis.

Summary

Implant-supported frameworks require a high level of precision of fit.

Figure 10. The bonded assembly.

Figure 11. The bar has been removed for illustrative purpose.

Figure 12. The rubber dam has been removed, and the assembly is readied for a pick-up impression.

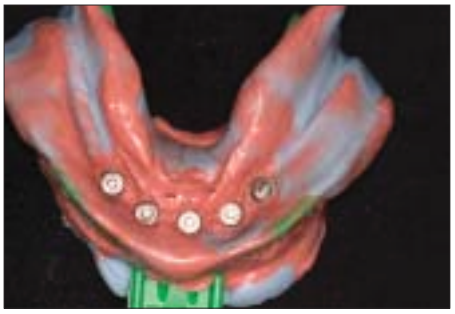

Figure 13. The pick-up impression is relating the soft tissue to the implant position.

Figure 14. The final precision cast.

Figure 15. A maxillary impression bar.

Figure 16. The final hybrid restoration.

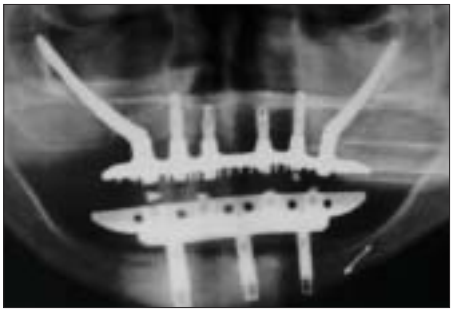

Figure 17. Radiographic depiction of final maxillary hybrid prosthesis.

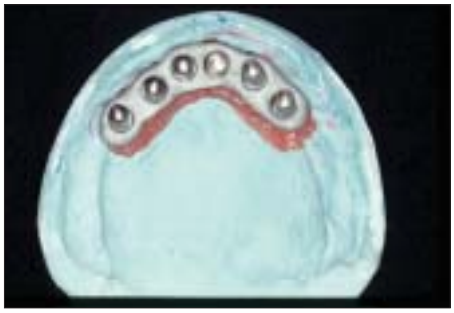

Figure 18. An impression bar on the primary cast.

Figure 19. Photo polymerization of the Panavia F cement.

Figure 20. The screw-retained maxillary hybrid.

Well-fitting frameworks will minimize prosthetic and biologic complications. Clinically attaining this level of prosthetic precision is difficult, and many production techniques have been developed. The objective of the implant team is to deliver a high-quality restoration through a predictable production process. The predictability of the process enables the control of time, cost, and quality. A framework fitting a cast will only fit in the mouth if the cast is an accurate reflection of the intraoral situation. The objective of the described technique is to generate a predictable precision cast. The additional cost of the impression bar is easily recouped with the decrease in clinical and laboratory time. Improving the level of control of the production process will decrease the stress of the team serving the implant patient. CDA

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Dogs of Distinction

Dogs seem to be very much in the news lately. Not that the peccadilloes of Hollywood and sports figures are in any danger of being supplanted, but we take this as a healthy trend because dogs are guileless and what the world needs now is a moratorium on guile.

Unlike humans, for whom duplicity is a way of life, dogs such as Lassie, for example, have nothing to gain financially by demonstrating forthrightness and integrity in their daily lives. Timmy was rescued interminably from wells, quicksand and other adolescent katzenjammers, including death by chocolate. Lassie's innocence was never compromised, even though she kvetched between pants that the kid must surely be retarded. A little extra kibble and an ear scratch was all she craved.

That's why it is refreshing to read of doggy news such as this item out of Corbin, Ky. It seems 6-year-old Scooby loses his cool during a thunderstorm and bolts across a highway, where he is hit by a car, injuring his tail and leg. According to Dr. Gerald Majors of the Corbin Animal Clinic, what happens next is nothing short of amazing. Scooby instantly realizes his predicament will not be cured by licking, so he hobbles, limps and drags himself through subdivisions, minimalls, and three lanes of traffic and presents himself at the doorstep of the clinic. He is then refused admittance because being hit by anything less than a Mercedes Benz is not a covered benefit —

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What the world needs now is a moratorium on guile.

Something about an animal in the lap snoozing benignly without a care in the world, a small rivulet of drool moistening her dewlaps, apparently induces a similar effect in the patient.

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just kidding — of course he is cared for and is recovering nicely, thank you. The staff is still amazed that Scooby did the right thing without referring to a Global Positioning System or obtaining a specialty referral from his primary care vet.

Just south of Miami, the brainchild of Elena de Mesa is flourishing, according to the *National Enquirer*, that last bastion of journalistic integrity. Elena is a professional dog trainer and certified canine behavior specialist whose five-acre Totally Dog Daycamp nestled among the palm trees is a pooch paradise. It features a bone-shaped swimming pool, sundeck and a doggie nap house. Each morning, the Doggie Bus corrals the eager tailwaggers for a day of swimming, socializing and indulging in indescribable delights of olfactory scanning. Snoopy never had it so good.

From Orange, Calif., comes the announcement that a Labrador retriever named Novella has just been inducted into the Kiwanis Club, the first such nonhuman member of Kiwanis International. Novella just graduated from seeing-eye training school and now proudly wears the white Kiwanis medallion with the blue capital K around her neck.

Naturally, this has members of the Lions Club figuring on ways to top this media-grabbing event by inducting a full-grown king of the jungle without running afoul of various local laws or endangering the lives of other members. Elsewhere it is rumored that a gorilla named Cyril from an unnamed zoo has been proposed for membership by a Rotarian from Weehawken, N.J. There is a hang-up in the application hinging upon Cyril's interpretation of the club's motto "Service Above Self." He thinks it could possibly be a threat to his banana interests.

Dentistry may be on the verge of a breakthrough that could see the acquisition of high-tech curing lights and digital X-rays being put on the back burner. Enter Sophie, an 8-year-old poodle weighing in at about 20 pounds. Sophie resides in Memphis, Tenn., where a local dentist has found a viable substitute for Xanax. Sophie's official job designation is that of dental assistant, but instead of being proficient at taking X-rays and mixing cement, she has expanded her natural inclination to be a lap dog to that of being an animate sedative.

A patient arrives, as apprehensive as a cat six miles from sand. He or she reclines hesitantly in the chair, whereupon Sophie leaps nimbly into the patient's lap, describes a couple of circles like dogs do, and settles down for the duration of the dental procedure.

Why this would have a calming effect on a nervous patient is not clear, but apparently it does. Sophie is OK with a little ear scratching and head patting, but the dentist has had to rule out tummy rubbing and tickling a particular spot that causes the hind leg to oscillate vigorously for fear of jiggling the whole chair.

Something about an animal in the lap snoozing benignly without a care in the world, a small rivulet of drool moistening her dewlaps, apparently induces a similar effect in the patient. That the dog has canine teeth 2 cm long and might use them if disturbed, or that she possesses a bladder with finite capacity, has no relevancy if you can believe this dentist's clientele. Sophie's payoff is a dog biscuit, a stipend bound to incur favor with overhead-obsessed dentists contemplating the bottom line.

If, in addition, Sophie can be taught CPR and basic accounting, so much the better. Perhaps it is not too far-fetched to anticipate canine assistants who can sniff out missing charts or alert staff to deadbeat patients.

Give this some serious thought, is our recommendation. Ask yourself how many of your present staff can be motivated by a Milk Bone. Should you be a cat person, forget the whole thing. CDA