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Oral Sedation for Apprehensive Adults

Pain Update

Calculating Anesthetic for Patients

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ANESTHESIA

GARY H. CHAN, DDS

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DEPARTMENTS

FEATURES

Alan L. Felsenfeld, DDS

The Power of One

Two years ago Gov. Arnold Schwarzenegger failed to sign SB 1336. This is a bill that would have allowed qualified single degree oral and maxillofacial surgeons to perform isolated facial cosmetic surgical procedures within the purview of the Dental Practice Act. The criteria for permitting these individuals to do these procedures were restrictive and required a surgeon to demonstrate education, experience, and competence in this specific surgical area. A consortium of individuals within dentistry representing the California Association of Oral and Maxillofacial Surgeons, the California Dental Association, interested clinicians, and educators developed the legislative package.

The bill had its origin several years earlier as it was developed before being submitted for consideration. Numerous meetings were held and revisions offered until the involved parties agreed on the proposed language. CDA and CALAMOS then found a sponsor to introduce the legislation and the process began. As most of us understand, the pathway to having a bill brought before the Legislature and ultimately go to the governor for consideration is somewhat tortuous. Various committees of the Senate needed to consider it from their perspective. Hearings were held and communities of interest, including many of our member dentists, as well as competing surgical specialties who viewed this legislation as a threat to their practice, provided testimony. After those hearings and passage out of the committees, the Senate as a whole approved it. With passage in the Senate, the process was repeated in the Assembly, including the committee hearings and testimony. During the entire process there was much made of the issue of "dentists doing facelifts" in the press and on television. Television interviews with plastic surgeons, showing a patient who, it was suggested, was operated on in another state by an oral and maxillofacial surgeon with a poor result, and joking by news commentators was noted on several occasions. Despite this and the tedious process of the legislative procedure, the bill passed all of the committees and both houses of the Legislature virtually unopposed and was sent to Gov. Schwarzenegger in August 2004 for his consideration.

The governor vetoed the bill with a veto message requesting that his Department of Consumer Affairs complete an occupational analysis to determine if oral and maxillofacial surgeons had the education or could receive additional training to perform cosmetic procedures without compromising patient safety. During the ensuing year the analysis, complex in itself, was done and a result very favorable to oral and maxillofacial surgery was forthcoming.

As the occupational analysis was being developed, reintroduction of the bill in January 2005, as SB 438, with similar committee and legislative evaluation took place and the bill was once again sent

As most of us understand, the pathway to having a bill brought before the Legislature and ultimately go to the governor for consideration is somewhat tortuous.

forward to the governor for signature. After the second round of legislative review, and significant opposition by the plastic surgeons, the governor signed the bill last September with a message noting the positive outcome of the occupational analysis. This represents a significant legislative victory for the two organizations.

Interaction between a specialty organization with a vested interest and the CDA, which represents all dentists, was effective in getting the bill through the Legislature and to the governor for his signature. Although the number of members who will be affected by this legislation is relatively small, CDA supported the CALAMOS position that there was an inequity and discrimination in current law. There was a coordination of strategy and effort between the two groups, coupled with grass roots mobilization of members in both organizations, and this strong base was effective in the success of the legislation. We can be proud of the efforts that were made and the united front of these two dental organizations that allowed this significant milestone to be achieved.

The important lesson that can be derived by the successful lobbying efforts of the CDA and CALAMOS is that with collaborative programs, significant strides can be made. When dentistry speaks with one voice, there are fewer roadblocks to success in the legislative arena. With this unity, amazing things can be accomplished. We must not forget that. ■■■■

Comments, letters and questions can be addressed to the editor at alan.felsenfeld@cda.org.

Dan Hubig

The Case for Dental Sealants in California

By David F. Nelson, DDS, MS, and Rudy Blea

There is an epidemic of dental decay in California compromising the health and quality of life of California's children. Left untreated, tooth decay often has serious consequences, including needless pain and suffering, difficulty speaking and chewing, and lost days from school. Additionally, poor dental health in childhood impacts overall health and well-being throughout a person's lifetime. Proven methods for reducing tooth decay in children, including fluoridation and the use of dental sealants, have been significantly underutilized in California.

The underuse of dental sealants is particularly notable, as California

Private practitioners must continue to place sealants on their patients who have incipient caries in their permanent first and second molars and are between the ages of 7 and 12.

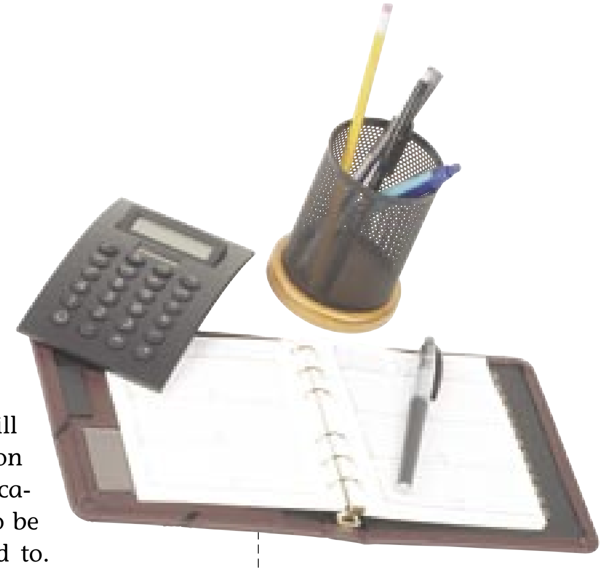
ranks 20th of 25 states participating in the National Oral Health Surveillance System, in the percentage of third-grade children who have received dental sealants. With just 27.6 percent of third-grade students receiving sealants, California falls well below the U.S. Public Health Service's Healthy People 2010 Objectives, which call for 50 percent of 8- and 14-year-old children to have sealants placed on one or more permanent molar teeth. While concerns regarding inadvertent sealing of dental caries may have initially contributed to these low sealant rates, a number of studies have put this misapprehension to rest. At this time, sealants are widely accepted as the best prevention for occlusal caries.

In 2005, the Dental Health Foundation, along with the California Department of Health Services and the California Dental Association Foundation, conducted an oral health needs assessment of 21,000 kindergarten and third-grade students in a representative sample of California schools. The results show that more than half of kindergarteners and more than 70 percent of third graders have experienced tooth decay, and more than a quarter of them have untreated decay. Overall, 26 percent of the children screened had a need for dental care. However, the Dental Health Foundation survey found inequities in the need for dental care among children in families of low socioeconomic status and children of color. These children are much more likely to have tooth decay and suffer the consequences of untreated dental disease. Furthermore, children at schools participating in the National School Lunch Program and School Breakfast Program are 50 percent more likely to have untreated tooth decay, and twice as likely to require urgent treatment for their untreated dental disease, as their counterparts in other schools.

The only school-based program in California that delivers large numbers of sealants to high-risk, low-income children is the Children's Dental Disease Prevention Program. This program reaches out to approximately 300,000 underserved children by serving schools where participation in the National School Lunch Program and School Breakfast Program is 50 percent or greater. Since these students suffer disproportionately from dental decay when compared with more affluent students, preventive measures such as dental sealants help reduce the health disparities in the overall student population. However, government programs like the Children's Dental Disease Prevention Program can only do so much to assist California in meeting the Healthy People 2010 goals.

Private practitioners must continue to place sealants on their patients who have incipient caries in their permanent first and second molars and are between the ages of 7 and 12. This will ensure these teeth will have the cavity protection afforded by dental sealants. The combination of dental sealants and fluoridated drinking water is the ideal remedy for reducing dental decay. This article is a reminder that California has a long way to go to meet the Healthy People 2010 objectives for sealants and fluoridated water (75 percent of Californians drinking fluoridated water). As California moves forward in its efforts to become a leader in oral health, dentists must be diligent in providing all available treatment modalities such as dental sealants, fluoride supplements, fluoride varnish, and topical fluoride to their patients where applicable.

David F. Nelson, DDS, MS, is a consultant, and Rudy Blea, BA, is chief, Office of Oral Health, California Department of Health Services, in Sacramento, Calif.



Annual Plan Can Be a Great Guide to Success

Good planning may be the difference in having a successful career in dentistry or having one that's just ho-hum.

According to an article in the summer 2006 issue of the *Journal of the Indiana Dental Association*, the annual plan is a tool dentists can use to bring a greater amount of success to their practices.

"Its purpose is to determine what you want your practice to accomplish in a year and to break this down into realistic goals, which can be tracked monthly and daily," wrote James Pride, DDS, in an article before he died earlier this year.

The annual plan has two parts. One is the actual yearlong plan, an approximation of how one's year will go. The dentist needs to figure out the exact number of days he or she will work as well as vacation days. Continuing education days also need to be specified and adhered to. The plan also should include projected expenses and revenue. Small expenses, as well as large ones, should include variable and fixed costs. The second part of the plan is the smaller, monthly component. This is where one can adjust the plan to take account of emergencies such as illness.

While it's all right to adjust the plan monthly, one should never adjust the annual plan downward, Pride recommended. Staying true to the plans will, over the years, lead to greater success.

Restorative Resins Add Dimension to Forensic Dentistry

Researchers at the State University of New York at Buffalo have now found a way to identify remains based on the type of restorative resins found in teeth of victims of crimes or accidents. This is an important development because human remains sometimes are so badly damaged that most or all organic material is destroyed beyond use forensically. Resins, on the other hand, have staying power.

In an article published in the September 2006 issue of the university's *Dental Report*, authors detailed an experiment they conducted, placing five different kinds of resins in a total of six cadavers, with each body receiving a distinctive combination of resins.

Using an X-ray fluorescence unit, the researchers identified the remains of the cadavers based exclusively on the elemental makeup of the resins left over after cremation.

Abstracts Sought

Original investigations and case reports are being sought by the American Academy of Oral Medicine for its annual meeting April 17-21, 2007, in San Diego.

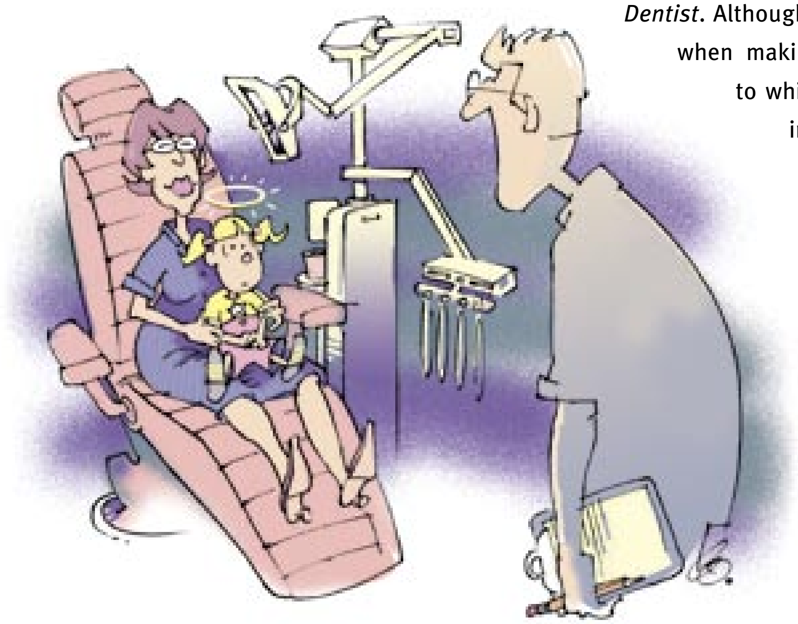
The AAOM abstracts committee will choose abstracts for oral and poster presentations, as well as for publication in the *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology* and *Endodontology* journals.

The deadline for submission is Dec. 15, 2006, and may only be submitted electronically. The review process will be completed by Jan. 31, 2007, and authors will be notified via e-mail. If accepted, authors are required to register for the meeting and be present during the scheduled poster/oral sessions.

For more information, contact Nathaniel Treister, DMD, DMSc, by e-mail, ntreister@partners.org. For information about the AAOM meeting, go to www.aaom.com.

Having Parent Chairside May Not Be in Best Interest of Child

Whether or not to have parents in the operatory depends as much on the particular parents as it does on the particular child, according to Carilynne Yarascavitch, DDS, in the September 2006 issue of *Ontario Dentist*. Although many dentists rely on their own personal experiences when making such decisions, Yarascavitch examined the extent to which scientific data exists to show a positive or negative influence on parental presence.

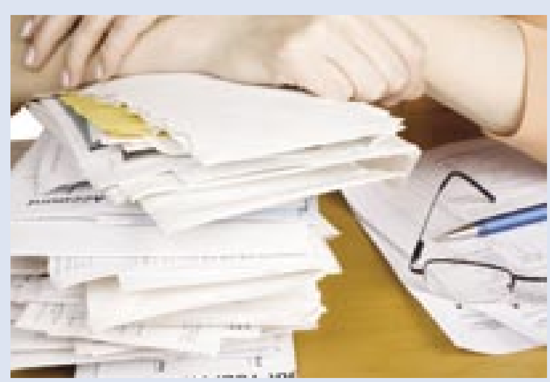


According to Yarascavitch's review, randomized studies failed to show that a parent in the room significantly reduces a child's anxiety. Parental presence can reduce anxiety, but only in children who are younger than 4 years old, are considered mild in temperament, or only have slight anxiety.

Studies also showed that parents who exhibit high levels of anxiety can have a negative impact on their children's anxiety, transferring tension to the children as well as nervousness, worry, or apprehensiveness. Those parents should be discouraged from accompanying the child in the operatory.

Tax Tip: Don't Forget Your Documentation

Like all small-business owners, dentists in private practice should dedicate a considerable amount of their attention and time to tax issues. In the August issue of *Today's FDA*, the publication of the Florida Dental Association, Keith Johnson, a certified public accountant, offered some tips for dentists looking to take advantage of tax deductions the IRS allows them.



Among Johnson's tips and deductions that may lessen a practice's income tax:

- Benefits paid to employees, such as health coverage and retirement, can be deducted.
- Cell phones and Internet costs, if used for business, can be written off.
- Continuing education and travel for business are typically deductible.
- Only take deductions that can be backed up with documentation. This is especially vital in cases where some items for which one is seeking a deduction also are used personally.
- Remember the car mileage.
- Some fixed assets, such as computers, can be deducted completely in the year in which they were purchased.
- Some purchases like office equipment and furniture can be depreciated.

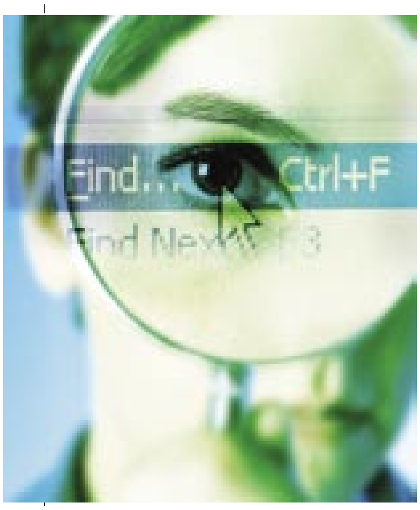
More and More People Using Search Engines to Find a Dentist

With people spending so much time online, an increasingly popular way to look for a dentist or research a particular practice, is to let their fingers do the walking on the Web.

"If a potential patient hears your name in a casual conversation, you can bet they will try to find you on the Internet before they call directory assistance," wrote Bruce Terry, DDS, in his column, "Cyber Salon," in the May/June issue of the *Pennsylvania Dental Journal*. "The general public also wants to see your name on the Internet. It gives you credibility."

Terry believes it is important for a dentist to establish a presence on the Web. One can pay a professional to construct a site and host it, or a dentist can create their own site, containing all the information they want their patients to have, with an Internet service provider.

Whatever the dentist decides to do, Terry suggested maintaining the site with accurate information. Dentists can post anything they want on their site as long as it comports with the regulations of their state dental board, the ADA Code of Ethics, and their state dental society's code of conduct.



Another task that should be performed periodically is to conduct a search for information about oneself on the Web. Dentists can use their favorite search engine to look up their name and practice. One might be surprised to see one's name listed at a number of sites. Some of these listing can be good news … or not.

"Perform frequent searches to make sure the information about you is accurate," said Terry. "Get on the Internet, but make sure you look good."

Upcoming Meetings

2006

Dec. 3-6	International Workshop of the International Cleft Lip and Palate Foundation, Chennai, India, (91) 44-24331696.

2007

April 15-21	United States Dental Tennis Association, Sarasota, FL, www.dentaltennis.org.
April 17-21	American Academy of Oral Medicine Annual Meeting, San Diego, www.aaom.com.
May 3-6	CDA Spring Scientific Session, Anaheim, (866) CDA-MEMBER (232-6362).
June 27-July 1	Academy of General Dentistry Annual Session, San Diego Convention Center, (888) 243-3368.
Sept. 27-30	American Dental Association 148th Annual Session, San Francisco, www.ada.org.
Nov. 27-Dec. 1	American Academy of Oral and Maxillofacial Radiology 58th Annual Session, Chicago, www.aaomr.org.

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

Pioneers and Predecessors

GARY H. CHAN, DDS

It has been referred to as “the most significant event in American medical history” by the American Society of Anesthesiologists.

On Oct. 16, 1846, at approximately 10:15 a.m., an event occurred that would change the world. On that day at Massachusetts General Hospital, in what is now referred to as the Ether Dome, a dentist, Dr. William T. G. Morton, publicly demonstrated the first successful ether anesthetic. After administering the ether utilizing a glass reservoir device, Morton said to renowned surgeon Dr. John Collins Warren, “Your patient is ready, sir.” Under general anesthesia, Dr. Warren removed a jaw tumor from the neck of 20-year-old Edward Gilbert Abbott, a printer and editor. Following the surgery, the patient replied, “I did not experience pain at any time, though I knew that the operation was proceeding.” Dr. Warren remarked to the gallery of observers, “Gentlemen, this is no humbug.” Previous to this event, at this same location, Horace Wells, another dentist, had attempted to demonstrate the use of nitrous oxide. He was later credited with the discovery after his death.

Guest editor / Gary H. Chan, DDS, is an oral and maxillofacial surgeon and a dentist anesthesiologist. He is an assistant clinical professor for the departments of Oral and Maxillofacial Surgery and Dental Anesthesiology at Loma Linda University School of Dentistry. He is president of the California Dental Society of Anesthesiology, a fellow of the American Dental Society of Anesthesiology, a diplomate of the American Dental Board of Anesthesiology, and a diplomate of the National Dental Board of Anesthesiology.

"Gentlemen, this is no humbug."

Sitting in the original Ether Dome gallery at Massachusetts General Hospital, I had the opportunity to listen to a live lecture on pediatric anesthesia. Though the lecturer was interesting and very knowledgeable, I found it difficult at times to keep my mind focused on the speaker. Instead, a picture on the wall depicting the first demonstrated ether anesthetic in this very room seemed to mesmerize me and make the figures in the painting come alive. The very room with its rich history, artifacts, and commemorative plaques seemed to inform the onlooker of the significance of being at the anesthesia world's "ground zero." The essence of the room spoke of pioneers before who had learned in this great teaching amphitheater of healing and anesthesia to alleviate pain and suffering. They had gone out from here to treat patients and to make a difference in their part of the world. I left the amphitheater with a sense of awe and respect for the contributions of dentists Dr. William Morton and Dr. Horace Wells.

Now, sitting thousands of miles from the Ether Dome in Boston, I am writing this at Loma Linda University where another more recent pioneer, Dr. Niels Bjorn Jorgensen (1894-1974), first demonstrated what is now known as the Jorgensen or Loma Linda technique of IV sedation for dentistry. He notably combined the ideas of sedation and dentistry. He recognized a need to provide a means to calm the anxious dental patient with predictable safety. He developed both oral and intravenous techniques. Dr. Jorgensen advanced dentistry's understanding of pain and anxiety, and provided safe techniques to address these dental problems. Thousands of dental practitioners and patients have benefited from his research.

As guest editor for this issue dedicated to anesthesia and analgesia, I wanted the issue to be practical to the every day practice of dentistry. The individuals I asked to write articles are not only some of the brightest stars today in our profession, but they are also practicing clinicians. They are actually "in the trenches" with the rest of us. They are not only excellent clinicians, but also gifted teachers and communicators. I am very grateful and appreciative they agreed to be contributors for this issue. As many of you know, taking time out of demanding academic, patient, and family schedules to author a journal article is difficult. I would like to publicly thank Dr. Alan Kaye, Dr. Stanley Malamed, Dr. Robert Merin, Dr. Larry Trapp, Dr. Joel Weaver, and Dr. John Yagiela (look for Dr. Weaver's and Dr. Yagiela's articles in the January 2007 issue) for their outstanding contributions. They are representative of Loma Linda University, Ohio State University, University of California, Los Angeles, and University of Southern California.

I hope you will find these articles informative and practical. Some of the information is by design to review and refresh basic principles, while also including the latest information on local anesthetics and pain control. My intent is to provide the reader with information that will be useful, while assessing the difficult anesthesia/analgesia patient and provide answers to everyday anesthesia questions. It is also to encourage all dental practitioners to appreciate the historical path to our current ability to administer anesthesia to our patients, which was earned tediously by the dental pioneers and predecessors. Strive to update your anesthesia knowledge regularly. I invite you to become a member of the California Dental Society of Anesthesiology (www.cdsa.info). CDSA is a nonprofit organization dedicated to providing continuing education in the area of dental anesthesiology. All dentists are welcome. Thank you for the privilege and honor of being your guest editor. May your patients be safe and your practice successful. ■■■■

Anesthesia Safety … Swiss Cheese Style

GARY H. CHAN, DDS

Revolutions do not start at the striking of a clock or the drop of a hat. Variables contribute over time in varying degrees of importance, are set in motion, and combine in a unique way that history is changed or made. Circumstances are such that the exact conditions for change give birth to new ideas, and over a period of time we have change. This might be a positive atmosphere to cultivate a revolution but not a predictable, good recipe for anesthesia patients' safety.

Sitting in a review of closed claim insurance cases, I was impressed we were reviewing cases that were similar to cases I saw in my office every day. The common factor in these cases was usually a small compromise(s) by the clinician that eventually contributed to a negative outcome.

It has been said that administering anesthesia is 99.9 percent boredom and 0.1 percent pure panic. So as anesthesia providers, we are constantly looking for that case that will cause that panic. Unfortunately, the sun still shines, the birds still sing, and flowers still bloom on the day that a catastrophic emergency anesthesia event unfolds. So how do we with predictability recognize these "accidents waiting to happen"?

Consider also what we were told in regard to AIDS/HIV in the 1980s. Treat **every** patient as if they had AIDS/HIV, and therefore we would have nothing to worry about. After all, we really don't know who is actually HIV positive. I ask you to consider driving a car on the highway. You look in the rearview mirror and you see a California Highway Patrol vehicle behind you. Heart rate and BP increase, and instantly you are on your best highway behavior. However, as the miles go by… 10, then 20, then 100 … our guard slackens over time. My point is that we relate to mile 1 differently than we do mile 100. Familiarity can breed complacency. Even the members of the Secret Service assigned to such careful matters as guarding the president are rotated. Why? Because eternal vigilance over extended time is contrary to human nature.

Human nature tends to presume on the future. What has happened before will happen again. What has not happened will not happen. Since I have never had a serious emergency or death

Guest editor / Gary H. Chan, DDS, is an oral and maxillofacial surgeon and a dentist anesthesiologist. He is an assistant clinical professor for the departments of Oral and Maxillofacial Surgery and Dental Anesthesiology at Loma Linda University School of Dentistry. He is president of the California Dental Society of Anesthesiology, a fellow of the American Dental Society of Anesthesiology, a diplomate of the American Dental Board of Anesthesiology, and a diplomate of the National Dental Board of Anesthesiology.

CHOOSE YOUR LOCAL ANESTHETIC WITH CAREFUL REGARD FOR THE PATIENT'S HEALTH HISTORY, ASPIRATE FREQUENTLY, AND INJECT SLOWLY.

in my office, I probably won't. "I am more careful than those other guys" (Superman syndrome) or "It won't happen to me." Just as no happy couple gets married with the idea of having a bitter divorce, no practitioner starts an anesthetic presuming or knowing there will be a negative outcome or death.

However, familiarity or routine need not give way to complacency. Take for example, pilots. Familiarity is a routine that is unwavering. Once in the cockpit, the pilot goes down his preflight check, even if he just landed 20 minutes before and "nothing has changed." This unwavering rigid routine stays unchanged flight after flight. We should treat certain areas of our office as a "cockpit" or "top security area." In other words, certain times (e.g., immediate preop), places (e.g., operating room or surgery suite), and procedures (e.g., have patient verbally confirm proposed procedure) should parallel the safety model of pilots. For example, rather than saying we must be safe all the time (though we must), perhaps we can accomplish this with a method more compatible with our nature by having certain "high alert" areas and/or times in the office. In our office, the cockpit is the surgery suite. High alert is the condition beginning with our preoperative checklist where at least two other staff members have asked integral questions of the patient. (e.g., NPO status, allergies, meds, confirming tooth/surgery, etc.).

Dr. David L. Anderson

Airline and fighter pilots practice in-flight simulators to regularly review flight emergencies, takeoffs and landings. They review bad outcomes and "near misses." In a similar manner, we have now implemented simulated medical office emergencies in our office. We review treatment of intra-op/in-office medical emergencies with our staff at least once a quarter.

Finally, always remember the Swiss cheese safety model, thus named because of the holes in the cheese. The medical safety model is a multilayered approach that attempts to protect the patient, realizing that no one layer is foolproof, or we would never have any negative outcomes. When the "holes" in the Swiss cheese slices "line up" across the various layers of safety, the bullet goes all the way through the holes in the layers and the patient is hit. We spend our time trying to make the holes as small as possible and/or trying to add more layers of safety. Statistically, most office anesthesia medical emergencies are avoidable. Choose your local anesthetic with careful regard for the patient's health history, aspirate frequently, and inject slowly. Once you develop an anesthesia algorithm in your office, stick to the plan, and do not compromise your routine. Cancel cases that need medical consultation or patients with temporary compromised respiratory conditions (i.e., "Live to fight another day"). Have a written medical emergency protocol. Simulate emergencies with your staff regularly (quarterly). Review your charting protocol during an emergency. Learn from "near misses" by reviewing them. Stay eternally vigilant by having specific times of "high alert" and stepping back down to "routine alert." This helps to preserve the need for routine attentiveness and hopefully avoid the pull toward complacency. Clinicians who are prepared tend to be more "lucky."

This article is dedicated to Dr. David L. Anderson, who advocated and taught dental anesthesia and "Medical Emergencies in the Dental Office" at Loma Linda University, School of Dentistry. Always a gentleman and scholar, Dr. Anderson passed away June 26, 2006, after a courageous fight with cancer. He was an outstanding teacher, colleague, and friend. ■■■■

Prophylactic Education: Don't Leave Yourself Unprotected

ALAN H. KAYE, DDS

I feel fortunate and thankful to be practicing within a profession that has afforded me an opportunity to provide dental anesthesia for my patients. Along with that opportunity comes the responsibility of practicing to a high standard of care that the public has grown to respect, expect, and trust.

The ability to administer this form of anesthesia is a privilege given to us by our state, which represents the public and our peers. They do that because we, the dental community, through dental board oversight, have demonstrated the ability to deliver anesthesia in a safe and effective way. This privilege has been based on decades of providing superb dental anesthesia, hard work, and goodwill that dentists have garnered over the years.

Those of us in dentistry who practice anesthesia and sedation modalities must be vigilant to provide these services in a safe and effective manner. Our colleagues in dentistry and medicine, as well as the public that we are privileged to serve, will always "hold our feet to the fire" when it comes to providing these services safely. We are proud of our heritage with the knowledge that dentists invented anesthesia (Horace Wells, DDS, 1844; William Morton, DDS, 1846).

Many of us have seen what consequences can occur when an anesthetic gets out of hand, resulting in a bad outcome. Patients are not expected to have bad events in dental offices. In the minds of the consumers, poor results are reserved for the severely ill patient in the hospital. Patient selection is the No. 1 issue related to the majority of bad outcomes. Deciding whether the patient needs to be treated in the office will always be a topic for discussion and critique. Therefore, the optimal evaluation and diagnosis must never be compromised because of monetary reward.

In the past century, all that was necessary to deliver anesthesia was a mask or IV, and the rest was in the eyes of the beholder. Today, every dentist who wants to provide anesthesia in the office needs to obtain a permit and be trained in emergency procedures. When general anesthesia was no longer allowed in Florida following a rash of deaths in plastic surgery offices, dentists were allowed to continue delivering anesthesia. In Florida, dentists are self-policed and maintain an exceptional level of care. The judge adjudicating the matter was impressed by the way dentistry examined their doctors, making sure they were practicing to a standard consistent with patient safety. The judge admonished the physicians, that they could learn a lot about governance of peers from the dentists.

Author / Alan H. Kaye, DDS, is a fellow for both the American College of Dentists, and the International College of Dentists, and is program director and clinical chief of the Department of Dentistry/Oral and Maxillofacial Surgery at Cedars Sinai Medical Center in Los Angeles. He has been in private practice, oral and maxillofacial surgery, for more than 30 years and was a former president of the Dental Board of California.

These are good times for dentistry because of our anesthetic capabilities. The public is becoming more aware of alternatives to a "white knuckled" visit to the dentist. There are so many ways a patient can receive alternative treatment for anxiety and pain control: oral sedation, light IV sedation, deep IV sedation, and general anesthesia are available in the dental office. We have come a long way in patient management.

Of course, all this comes with a price of vigilance and continuing education. As a past president of the Dental Board of California, I encourage all dentists who engage in the delivery of any form of anesthesia and/or sedation to join and become an active member in organizations that promote broad-based, academic education in anesthesia. As an excellent example of this type of organization, the American Dental Society of Anesthesiology recognizes and supports all levels of sedation and anesthesia delivery, and therefore brings all of dentistry under one roof. There is no substitute for continuing education, especially when it is offered by an organization that is chartered to deliver the finest anesthesia programs available. ADSA does not sell anything, nor does it try to promote specific sedation or anesthesia practices. It exists to educate because education is what it does best.

ADSA works hard to offer outstanding and clinically relevant education programs to the multitiered system of members. There is something for everyone. There is no substitute for a highly qualified organization that has only one focus: education, education, education. Remember, there is no replacement for a highly qualified organization that commands the respect of the dental profession. ADSA should be the official home for all dentists who are in pursuit of excellence in sedation and anesthesia.

So what are you waiting for? In California alone, there are more than 400 members in the California Dental Society of Anesthesiology, which is a very significant number. This size was attained by explaining to dentists how important quality sedation and anesthesia education is, and that there is no substitute for aligning with an organization that has an impeccable track record. Dr. Gary Chan, our CDSA president, has been working very diligently in an attempt to set up meetings that will not only interest California practitioners, but dentists from all over the country.

The next time you receive a mailing or attend an ADSA meeting, please remind yourself to join. You will be happy you did knowing this membership helps to reinforce your education as well as the credibility that belonging to a well-respected organization has to offer. Cream still floats to the top, so join today and secure your future. When a lawyer asks you "So tell me doctor, how do you stay current with your anesthesia continuing education?" your answer should be "I'm a member of the ADSA." ■■■■

To request a printed copy of this article, please contact / Alan H. Kaye, DDS, 436 N. Roxbury Drive, Suite 107, Beverly Hills, Calif., 90210.

Mechanisms of Acute Pain: An Update

LARRY D. TRAPP, DDS, MS

ABSTRACT

Dentists are faced with human suffering generated by dental diseases and their treatments on a daily basis. This exposure to suffering has resulted in the dental practitioner's constant pursuit of more efficacious ways to decrease their patient's acute pain experience. Expertise in the administration of local anesthetics and the use of nitrous oxide/oxygen inhalation sedation were born from this pursuit. Advances in the management of acute pain will follow an improved understanding of the physiology of acute pain, the physiology of the immune system and their interaction. Indeed, their interaction has become a productive area of investigation. This article reports on promising new developments in acute pain research. Our current understanding offers a few new recommendations and a vision of a less painful experience associated with dental diseases and their treatments.

Many may remember the introduction of Melzack and Wall's groundbreaking theory that the brain could modulate incoming pain perception, the so-called "gate control" theory.[1] Because of that well-known article published in 1965, general interest as well as directed research into pain increased through the next four decades. Research funding organizations increased their focus on the treatment of acute pain even more after the Agency for Healthcare Policy and Research, publicized its clinical practice guidelines in 1992.[2] The American Society of Anesthesiologists, a large organization of physician anesthesiologists, also played a leadership role by developing, publishing, and later revising practice guidelines for acute pain management.[3] In 2001, the Joint Commission on Accreditation of Healthcare Organizations, stipulated that all health care institutions seeking future accreditation would be required to have an acute pain management program.[4] Thus, JACHO provided a major stimulus for clinical programs, as well as research interest and funding. As part of the new accreditation standards, JCAHO established patient satisfaction as a major goal for health care institutions.

Author / Larry D. Trapp, DDS, MS, is an associate professor, dental anesthesiology, and program director, dental anesthesiology, Department of Dental Anesthesiology, Loma Linda University School of Dentistry.

ONE MAY SEE AN EXAGGERATED PAIN RESPONSE TO A REPEATED PAIN STIMULUS, OR EVEN SPONTANEOUS PAIN WITH NO OBVIOUS STIMULUS AT ALL.

Declarations of the patient preferences in pain management and a postoperative patient evaluation protocol have now been incorporated into hospital policies. Reprioritization of the patient's pain experience in the perioperative period and the associated data collection have dramatically increased institutional interest in generating a positive patient surgical/recovery experience.

Advances in Our Understanding of Pain

Several advances in the understanding of the physiology of pain are helping to optimize the treatment of acute pain and have suggested an expansion of research into pain. These advances are so fundamental they require changes in the teaching of physiology and pharmacology in dental and medical education.

Peripheral Sensitization

Any surgery can be presumed to be a planned injury to the body. The injury may actually be secondary to the use of lasers, electrocautery, heat from dental drills, cutting of tissues, suturing, and retraction at the surgical site. When any injury is inflicted, free nerve endings and nonspecific receptors (nociceptors) are stimulated. The injury also causes the local release of inflammatory agents, as well as local sympathetic amines that have the ability to lower the threshold of stimulation and shorten the latency of activation of those free nerve endings and nociceptors initially stimulated by the injury. Some of the inflammatory agents stimulate and sensitize, while others only stimulate. The clinical outcome is that one may see an exaggerated pain response to a repeated pain stimulus, or even spontaneous pain with no obvious stimulus at all.

Peripheral sensitization helps one understand why the light touching of a healing wound can elicit a very painful response (primary hyperalgesia). Also, it helps one understand why a painful response can be elicited by touching apparently normal tissue adjacent to a wound (secondary hyperalgesia). Another consequence of peripheral sensitization is the recruitment of nerves to pain conduction that are not normally used to send pain signals to the central nervous system. Some of these nerves do not pass through the parts of the spinal cord (i.e., specific laminae of the dorsal horn) that modulate pain. Hence, the central nervous system receives even more pain signals from the periphery; and central sensitization may ensue.[5]

Nociceptor activation in the perioral tissues is not conducted to the dorsal horn of the spinal cord. Rather, the transmission of pain is primarily to the medulla of the brainstem (i.e., nucleus caudalis) with nociception conducted in afferent portions of the trigeminal nerve with some additional afferent activity occurring in the seventh, ninth and 10th cranial nerves. Once in the brainstem, the noxious information is treated similarly to that received by the dorsal horn of the spinal cord.[6]

Central Sensitization

Acute peripheral pain signals cause changes in the brain and spinal cord (i.e., central nervous system) referred to as central sensitization, also known as "wind-up." When repetitive noxious stimuli generated by peripheral injury are received at the dorsal horn of the spinal cord, it causes a "conditioning" of the central nervous system such that there is enhanced pain responsiveness to future noxious or painful stimuli. It is believed that central sensitization can long outlast the original peripheral pain stimulus. It is interesting to note that general anesthesia does not inhibit central sensitization.[5]

Pain and Surgical Outcomes

Processing of peripheral pain stimulation in the central nervous system provokes spinal reflex activity, such as muscle spasm and sympathetic nervous system activity. In addition, supraspinal reflexes appear to initiate something called the Surgical Stress Response, SSR, that peaks in the postoperative period. It is generally felt that this stress response can cause or contribute to many, sometimes serious, postsurgical complications. It has a negative impact on the cardiac, coagulation, and immune systems. When the SSR is avoided as it can be by utilizing the acute pain management concepts discussed in this article, patients have fewer complications and are discharged from the hospital earlier.[7,8]

It is interesting that placement of local anesthetics in the area of surgery does not inhibit the stress-related mediators from being released into the bloodstream. However, despite the release of the pain mediators into the bloodstream, using local anesthetics to block pain stimuli from the site of surgery appears to reduce or eliminate central sensitization and the SSR. In summary, acute postoperative pain can cause recovery complications associated with the cardiovascular, pulmonary, renal, endocrine, immune, and gastrointestinal systems, and thereby delay release from the hospital and prolong recovery.[5]

LIDOCAINE WAS ALSO DISCOVERED TO REDUCE CARDIAC ARRHYTHMIAS LONG AFTER ITS INTRODUCTION AS A LOCAL ANESTHETIC.

Lidocaine: A Local Anesthetic or an Anti-inflammatory?

Both! One of the striking pharmacologic discoveries in recent years is that the group of drugs known as local anesthetics also have important anti-inflammatory properties.[9,10] The way that local anesthetics produce anti-inflammatory effects is not clear. They appear to decrease the movement of leukocytes from the blood to the site of injury. More specifically, local anesthetics decrease leukocyte adhesion to the endothelium of blood vessels, as well as the ability of the leukocytes to cross the endothelium of blood vessels.[10] Local anesthetics have also been found to reduce vascular permeability and thus, fluid losses in the obstructed bowel and in experimentally induced lung injury. However, intravenous application has been less efficacious than topical application. We will have to wait for future studies of local anesthetics as anti-inflammatory agents to realize their mechanism of action and their possible therapeutic applications. It is interesting to note that lidocaine was also discovered to reduce cardiac arrhythmias long after its introduction as a local anesthetic.

Evidence That NSAIDs Act in the Spinal Cord

Aspirin, although a nonsteroidal anti-inflammatory agent, is frequently excluded from the large group of recently discovered and marketed NSAIDS (e.g. ibuprofen) due to its higher incidence of side effects, which include epigastric distress, nausea, ulceration of the stomach and vomiting. In addition, the non-aspirin NSAIDS appear to be more efficacious as pain relievers than aspirin.[6] In this discussion, aspirin has been excluded from the group of NSAIDs.

It has been widely believed that the NSAIDs acted only on receptors that were located in the periphery. The NSAIDs reduce the synthesis of prostaglandins, which sensitized peripheral nociceptors.[6] It is now known that the so-called COX-1 receptors for NSAIDS are also located in the spinal cord, and effective analgesia of NSAIDs in that location has been documented. In fact, it is not only believed that the NSAIDS work in the spinal cord, but that this site of action may be more clinically significant than the peripheral sites of action.[11] In the future, NSAIDs may also be used in epidurals and spinals as are opioids and local anesthetics.

Opioid Receptors in the Peripheral Nervous System

Opioid receptor distribution has been thought of as limited to the central nervous system and some have believed only in the brain. It is now known that opioid receptors also exist in the peripheral nervous system on sensory afferent neurons.[12] There is an increasing body of literature that supports the injection or infiltration of opioids at a surgical site to achieve clinically significant analgesia.[13] Peripheral nerve opioid receptors are up-regulated in the presence of inflammation. Up-regulation takes place by axonal transport to the periphery of opioid receptors synthesized in the dorsal root ganglia.[12]

Immune Cells Synthesize Opioids

Endogenous opioid synthesis (only peptide opioids are synthesized in the body) has historically been attributed to parts of the brain or brainstem. One of the more intriguing discoveries is that circulating immune cells that migrate to sites of injury can synthesize and release opioid peptides.[12,14] It is noteworthy that peripherally synthesized peptide opioids appear to be devoid of the side effects of centrally acting exogenous opioids (e.g., nausea/vomiting, respiratory depression, constipation and sedation).

Opioid receptors are also found on immune cells. Opioid modulation of the proliferation of these immune cells and their functions has been reported.[12] These actions may be stimulatory or inhibitory. The role and importance of these findings to pain physiology has not yet been established. We can look forward to research into the therapeutic use of peptide opioids because they are unable to cross the blood-brain barrier and therefore may not have the well-known side effects of currently used opioids.

Clinical Implications of Our Current Understanding of Pain Mechanisms

When a patient arrives at the dental office with pain of dental origin, the practitioner must first decide whether the pain is associated with an infection. If so, the patient needs an appropriate antibiotic and acute pain therapy. An anti-inflammatory analgesic would be appropriate in light of the inflammation that accompanies infections, and a narcotic can be added if pain is judged to be moderate to severe. If the pain is solely of an inflammatory nature (e.g., a recent tooth fracture not involving the pulp), then an NSAID would be the drug of choice in order to reduce developing inflammation. However, the optimal time to implement acute pain management occurs before pain has started (as we encounter in postoperative pain).

Routine Nonsurgical Dental Treatments

Oral NSAIDS are the first choice of therapy for post-treatment pain of nonsurgical origin assuming no contraindication.[6] Most pain generated by procedures in this group will be adequately managed without the addition of other agents. Using an NSAID that can be given twice a day rather than the 4 to 5 times a day for some agents may improve patient compliance and thereby the result. It is optimum to take the medication before pain begins to minimize peripheral sensitization and avoid central sensitization. Therefore, taking the NSAID just before a short (one-half hour or less) procedure or just after a longer procedure is simply good planning to obtain the blood level of the NSAID when it is needed. Other analgesics (acetaminophen and opioids) should be used only as an added rescue analgesic or when NSAIDS are contraindicated.[6]

Routine Dental Procedures and General Anesthesia

If general anesthesia is to be employed as in treating the handicapped patient, a single administration of intramuscular ketorolac may be preferred because the immediate need for patient cooperation is obviated. The patient can be started on oral NSAIDs (if they will comply) six hours after surgery.

Surgical Procedures Causing Moderate to Severe Postoperative Pain

In the patient that is having surgery that is expected to cause moderate to severe postoperative pain, the infiltration of local anesthetics into the surgical site at the beginning of treatment (to provide anti-inflammatory effects) as well as a conventional regional block (e.g. an inferior alveolar block if appropriate) with a long-acting local anesthetic can provide a decreased pain experience for days.[6] If the procedure is long enough, infiltration and block may need to be repeated. The local anesthetic management is indicated whether or not general anesthesia is utilized during the treatment. Upon completion of surgery, an NSAID regiment should be instituted as soon as possible before the patient experiences pain. If general anesthesia is utilized, a single intramuscular dose of ketorolac may obviate the need for patient compliance and then the practitioner can institute a regimen of orally administered NSAIDs.

In order to be optimally prepared to minimize the pain and suffering from dental disease and dental treatments, dentists need to monitor future developments in acute pain control as well as developments in the management of inflammation.

Summary

We now know that advances in acute pain management will require a better understanding of the physiology of acute pain as well as a better understanding of the physiology of the immune system. Pain and inflammation are observed after tissue injury secondary to both disease and surgery. Our understanding of pain physiology and immune system physiology is growing at a rapid pace. Novel and more efficacious approaches to the treatment of acute pain will surely follow. ■■■■

To request a printed copy of this article, please contact / Larry D. Trapp, DDS, MS, Loma Linda University School of Dentistry, Loma Linda, CA 92350.

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Adult Oral Sedation in California: What Can a Dentist Do Without a Special Permit or Certificate From the Dental Board of California?

ROBERT L. MERIN, DDS, MS

ABSTRACT

A significant percentage of patients are fearful of dental procedures, and this has not changed significantly over the past 50 years. Apprehensive patients tend to avoid necessary dental treatment, and their quality of life is compromised in the long term. This article discusses the use of zaleplon, triazolam, and lorazepam to provide oral sedation for apprehensive adult dental patients. Patient evaluation, pharmacology, and selection based on duration of the dental procedure are discussed. Dentists can use the practical protocols and sample prescriptions provided in this article without obtaining special permits or certificates from the Dental Board.

Anxiety toward dental therapy has not changed significantly over the past 50 years, and various publications show that about 30 percent to 50 percent of patients are at least somewhat fearful of dental procedures.[1-5] Oral sedation, with appropriate doses of sedatives, can help reduce local anesthetic failures and decrease anxiety in a large percent of dental patients.[6,7] Oral premedication might be the sedative technique of choice for dentists because it is cost-effective, usually efficacious, requires minimal monitoring when correct doses are used, and is unlikely to result in complications.[8]

In 2006, Assembly Bill 1386 went into effect and added restrictions to the use of oral conscious sedation for adult patients. This bill was due to recommendations of a California Blue Ribbon Committee on Dental Anesthesia that was formed by the Dental Board of

Author / Robert L. Merin, DDS, MS, is a periodontist in private practice in Woodland Hills, Calif., a member of the American Dental Association Anesthesia Committee, a board member of the California Dental Society of Anesthesiology, and chairman of the California Society of Periodontists Conscious Sedation Committee.

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California. This independent committee represented the "communities of interest" on dental anesthesia in California (**Table 1**). The committee reviewed anesthesia trends in dentistry and presented the Dental Board with its recommendations.[9] The committee found that a significant number of dentists were attempting to produce conscious sedation in adults with oral medications. In order to protect the public's safety, the panel felt dentists who wanted to provide conscious sedation should have additional education on oral medications and sedation, and be required to have specific monitoring and emergency equipment in their offices. However, for the vast majority of dentists, the ability to prescribe adult oral sedative premedication remains unchanged.

The new law does not restrict dentists from prescribing sedatives in an attempt to produce anxiolysis. Anxiolysis is defined by the American Dental Association as the diminution or elimination of anxiety.[10] Anxiolysis is also defined as minimal sedation on the continuum of depth of sedation according to the American Society of Anesthesiologist (**Table 2**).[11] AB 1386 states, "Oral conscious sedation does not include dosages less than or equal to the single maximum recommended dose that can be prescribed for home use." Generally, these maximum doses can be found in references such as the package inserts, pharmaceutical Web sites, articles in dental literature, and yearly updated books such as the Physicians Desk Reference or USPDI.

The use of oral sedation premedication is both an art and a science. It is wise for each dentist to become familiar with only a small number of oral sedative regimens. In this way, one has a better chance of accurately predicting the correct dose for each patient, and understanding the precautions and side effects of each agent. Although there are a large number of sedatives that can be prescribed, recent dental articles have concentrated on the use of oral zaleplon, oral triazolam, and oral lorazepam.[5,7,12-16] The remainder of this article discusses guidelines and protocols for the use of these three medications.

Zaleplon is a short-acting hypnotic in the pyrazolopyrimidine class.[17] The onset of action of zaleplon is usually within 30 minutes, and it is rapidly eliminated with a half-life of approximately one hour. Zaleplon is a relatively new agent and there are relatively few articles on its use in dentistry. Both triazolam and lorazepam are benzodiazepam medications, and the main difference is in the effective time of sedation. The duration of action of triazolam is two to four hours compared to four to eight hours for lorazepam[5,13] (**Table 3**). General protocols for oral sedation with these medications are described in **Table 4**. It is important that the dentist review the patient medical and dental history to make sure there are no contraindications to these medications, and obtain informed consent prior to the oral premedication appointment. The patient must understand they will need a responsible adult to escort them when they take sedative medication. Suggested patient pretreatment instructions are presented in **Table 5**. Patients who are not reliable at following directions are not good candidates for oral sedative premedication.

This article provides guidelines for the anxiolytic doses for these medications, but these recommendations should not substitute for good clinical judgment and direct patient assessment. Patient factors such as liver enzyme induction, extremes of age, and tolerance because of past drug use may cause alterations in the proposed protocol. Precautions and drug interactions are presented in **Tables 6, 7, and 8**. If the calculated amount of medication is ineffective, the dentist can choose to terminate the dental appointment or continue if the patient is willing. If the patient's anxiety is not sufficiently diminished, the dentist must follow all normal dismissal procedures including releasing the patient to a responsible companion since the sedative may impair motor activity even when not relieving dental anxiety. A failure to produce anxiolysis may require a

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Table 1

CALIFORNIA BLUE RIBBON PANEL ON DENTAL ANESTHESIA

John A. Yagiela, DDS, PhD
Chair

Michael E. Cadra, DMD, MD
California Association of Oral and Maxillofacial Surgeons

Gary H. Chan, DDS
California Dental Society of Anesthesiology

Stuart I. Green, DDS
California Association of Oral and Maxillofacial Surgeons

Gary Klugman, DDS
Representing the Dental Organization for Conscious Sedation

Robert L. Merin, DDS, MS
California Society of Periodontists

David Rothman, DDS
California Society of Pediatric Dentists

Stanley R. Surabian, DDS, JD
California Dental Association

Larry Trapp, DDS, MS
California Society of Dentist Anesthesiologists

Bruce Valentine, DDS
California Dental Association

Table 2

CONTINUUM OF DEPTH OF SEDATION DEFINITION OF GENERAL ANESTHESIA AND LEVELS OF SEDATION/ANALGESIA*

(Approved by American Society of Anesthesiologists House of Delegates on Oct. 13, 1999, and amended on Oct. 27, 2004)

	Minimal sedation (anxiolysis)	Moderate sedation/ analgesia ("conscious sedation")	Deep sedation/ analgesia	General anesthesia
Responsiveness	Normal response to verbal stimulation	Purposeful** response to verbal or tactile stimulation	Purposeful** response following repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular function	Unaffected	Usually maintained	Usually maintained	May be impaired

Minimal sedation (anxiolysis) is a drug-induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

Moderate sedation/analgesia ("conscious sedation") is a drug-induced depression of consciousness during which patients respond purposefully** to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

Deep sedation/analgesia is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully** following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

General anesthesia is a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

Because sedation is a continuum, it is not always possible to predict how an individual patient will respond. Hence, practitioners intending to produce a given level of sedation should be able to rescue*** patients whose level of sedation becomes deeper than initially intended. Individuals administering moderate sedation/analgesia ("conscious sedation") should be able to rescue*** patients who enter a state of deep sedation/analgesia, while those administering deep sedation/analgesia should be able to rescue*** patients who enter a state of general anesthesia.

* Monitored anesthesia care does not describe the continuum of depth of sedation, rather it describes "a specific anesthesia service in which an anesthesiologist has been requested to participate in the care of a patient undergoing a diagnostic or therapeutic procedure."

** Reflex withdrawal from a painful stimulus is NOT considered a purposeful response.

***Rescue of a patient from a deeper level of sedation than intended is an intervention by a practitioner proficient in airway management and advanced life support. The qualified practitioner corrects adverse physiologic consequences of the deeper-than-intended level of sedation (such as hypoventilation, hypoxia, and hypotension) and returns the patient to the originally intended level of sedation.

Table 3

COMPARISON OF ZALEPLON, TRIAZOLAM, AND LORAZEPAM

	Zaleplon	Triazolam	Lorazepam
Available dosages	5 and 10 mg capsules	0.125 and 0.25 mg tablets	0.5, 1, and 2 mg tablets
Onset of hypnotic effect	15 to 30 minutes	30 minutes	30 to 60 minutes
Peak plasma concentration	1 hour	2 hours	1 to 6 hours
Duration of action	1 hour	2 to 4 hours	4 to 8 hours
Mean half-life	1 hour	2.3 hours	12 hours

Table 4

SUGGESTED PROTOCOL FOR THE USE OF ADULT ORAL SEDATIVE PREMEDICATION FOR ANXIOUS OR FEARFUL DENTAL PATIENTS

1. The dentist needs to determine the extent of dental treatment, evaluate the patient's medical history, research potential drug interactions, consult with the patient's physician, if appropriate, and obtain informed consent.

2. The patient must have a responsible adult companion for travel to and from the dental office. The patient must be escorted by this companion to and from the parking lot to prevent the patient from stumbling.

3. Patients take the prescribed medication according to directions and are instructed to have a light meal such as toast and beverage without caffeine.

4. Patients who have received oral sedatives are monitored visually and never left alone.

5. After the treatment is completed, postoperative directions are given to both the patient and companion, and the patient is released into the care of their companion for travel home. The companion is informed that the patient may have psychomotor and cognitive impairment for the rest of the day.

Table 5

SUGGESTED PATIENT PRETREATMENT INSTRUCTIONS

1. The sedative ____________________ (name of medication) is being prescribed to help reduce your anxiety before and during a dental procedure.

2. The medication may make you sleepy and impair your thinking and coordination. You must have a responsible adult companion for travel to and from the dental office.

3. You must be escorted by this companion to and from the parking lot to prevent you from stumbling.

4. You should take the prescribed medication according to directions, and you can have a light meal (no fat) such as toast without butter or margarine and beverage without caffeine. No grapefruit juice.

5. After the treatment is complete, a reliable companion must escort you out of the office and take you home. The sedative effects may linger for the rest of the day so you should have a responsible adult stay until you are able to take care of yourself.

Table 6

ZALEPLON PRECAUTIONS AND DRUG INTERACTIONS

Note this is a relatively new drug, and there are many potential drug interactions that have not been studied.

Relative and absolute contraindications:

Pregnancy, liver impairment, severe renal disease, respiratory disease, mental depression, children

Drug interactions that may increase effects:

Imipramine, thioridazine, cimetidine, erythromycin, ketoconazole, other central nervous system depressants

Drug interactions that may decrease effect:

Hepatic cytochrome P450 enzyme inducers such as carbamazepine, phenobarbital, phenytoin, rifampin

Foods that may increase effect:

Alcohol, valerian, kava, gotu kola

Foods that may decrease effect:

St. John's wort, caffeine. A high-fat/heavy meal can reduce the peak blood levels by 35 percent and the time to peak plasma levels by two hours.

Table 7

TRIAZOLAM PRECAUTIONS AND DRUG INTERACTIONS

Relative and absolute contraindications:

Acute narrow angle glaucoma, uncorrected open angle glaucoma, myasthenia gravis, respiratory diseases including severe sleep apnea and severe chronic obstructive pulmonary disease, pregnancy, lactation, severe liver impairment, renal impairment, children, mental depression, hypersensitivity to this drug or other benzodiazepines

Drug interactions that may increase effect:

Other central nervous system depressants, isoniazid, oral contraceptives, ranitidine, CYP3A4 inhibitors such as macrolide antibiotics (erythromycin, clarithromycin), azole antifungals, doxycycline, some calcium channel blockers

Drug interactions that may decrease effect:

Theophylline, CYP3A4 inducers such as aminoglutethimide, carbamazepine, nafcillin, nevirapine, phenobarbital, phenytoin, and rifamycins

Foods that may increase effect:

Grapefruit juice, alcohol, kava, gotu kola, star fruit, melatonin, valerian, chamomile

Foods that may decrease effect:

St. John's wort, caffeine

Table 8

LORAZEPAM PRECAUTIONS AND DRUG INTERACTIONS

Relative and absolute contraindications:

Acute narrow angle glaucoma, uncorrected open angle glaucoma, myasthenia gravis, respiratory diseases including severe sleep apnea and severe chronic obstructive pulmonary disease, pregnancy, lactation, severe liver impairment, renal impairment, children, mental depression, hypersensitivity to this drug or other benzodiazepines

Drug interactions that may increase effect:

Other central nervous system depressants, probenecid (used for gout).

Drugs that inhibit the oxidative metabolism of triazolam are less likely to affect lorazepam which undergoes direct glucuronide conjugation (Table 7).

Drug interactions that may decrease effect:

Theophylline. Drugs that induce the oxidative metabolism of triazolam are less likely to affect lorazepam that undergoes direct glucuronide conjugation (Table 7).

Foods that may increase effect:

Alcohol, valerian, St. John's wort, kava, gotu kola

Foods that may decrease effect:

Caffeine

Table 9

TOTAL ZALEPLON ANXIOLYTIC DOSING GUIDELINES

Weight (lb)	Age 41-64
<100	5 mg
150	10 mg
200+	10-15 mg

Elderly and debilitated patients are more sensitive to hypnotics, and the recommended dose for these patients is 5 mg. Doses over 10 mg in elderly and debilitated patients are not recommended. The maximum dose in the package insert is 20 mg for sleep.[17]

Table 10

TOTAL TRIAZOLAM ANXIOLYTIC DOSING GUIDELINES

Weight (lb)	Age 41-64
<100	0.250 mg
150	0.375 mg
200+	0.500 mg

Dose for debilitated or elderly patients should be reduced by 50 percent. Doses for healthy adults younger than 40 can be increased by 25 percent. With sublingual administration, systemic availability is approximately 27 percent higher compared with the same dose taken by the conventional oral route. The maximum single dose listed in the package insert is 0.5 mg for sleep.[18]
Adapted from Goodchild and Donaldson.[13]

Table 11

TOTAL LORAZEPAM ANXIOLYTIC DOSING GUIDE

Weight (lb)	Age 41-64
<100	1.0 mg
150	1.5 mg
200+	2.0 mg

Dose for debilitated or elderly patients should be reduced by 30 percent to 50 percent. Doses for healthy adults younger than 40 can be increased by 25 percent. The maximum single dose listed in the package insert is 4.0 mg for anxiety.[20]
Adapted from Goodchild and Donaldson.[13]

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change in future prescriptions, using the services of a dental anesthesiologist in the office, or referral to an office that provides conscious sedation or general anesthesia.

Goodchild and Donaldson reviewed the dental literature and recommended a maximum anxiolytic dose for triazolam of 0.625 mg, and a maximum dose of 2.5 mg for lorazepam.[13] Anxiolytic dosing guidelines are presented in **Tables 9, 10, and 11**. However, maximum and average doses are not appropriate for all patients, so it is necessary to adjust doses based on weight, age, health status, other medications the patient is taking, and previous patient experience with sedatives. The literature shows that age-related changes can impair benzodiazepine metabolism, and the maximum anxiolytic dose for elderly patients should be reduced by 50 percent for triazolam and 30 percent to 50 percent for lorazepam.[18-20] The opposite is true for younger adult patients (under 40 years) who may need a 25 percent increase in their weight-related anxiolytic dose. Sample prescriptions for morning and afternoon appointments are presented in **Tables 12, 13, and 14**.

When using a very short-acting agent such as zaleplon, there is a risk that recovery of psychomotor functions may take longer than one hour after the onset of action. Also, when taking triazolam with anxiolytic doses generally higher than the hypnotic dose, there is a risk that full recovery to a normal state of consciousness cannot always be anticipated at the completion of a four-hour procedure. Ganzberg found that 28.5 percent of the zaleplon-sedated patients and 78.5 percent of the triazolam-sedated patients felt that the sedative drugs lingered for the rest of the day.[12]

Consequently, zaleplon and triazolam patients must be accompanied by a responsible adult and not resume normal

Table 12

SAMPLE ZALEPLON PRESCRIPTIONS

Zaleplon comes in strengths of 5 mg and 10 mg

I. Morning and afternoon appointments
Patients are instructed to reduce the number of tablets they take in the morning if they feel sedate when they wake up in the morning.

Rx #1
Patient characteristics:
Age 45
Weight 160 lbs.
Health is good

Rx	Zaleplon 5 mg
Disp	Tabs #4
Sig	Take two tablets at bedtime the night before dental procedure, and come 45 minutes early to your dental appointment and take two tablets in the office. This is for sedation, and you need to be accompanied by a responsible companion. Do not drive.

Rx #2
Patient characteristics:
Age 68
Weight 160 lbs.
Health is good

Rx	Zaleplon 5 mg
Tabs	#2
Sig	Take one tablet at bedtime the night before dental procedure, and come 45 minutes early to your dental appointment and take the one tablet in the office. This is for sedation, and you need to be accompanied by a responsible companion. Do not drive.

activities for the remainder of the day. When using the short-acting sedatives, the opposite problem can also occur. The dentist must make sure there are no delays or interruptions or the sedation can wear off before the treatment is completed. When procedures tend to be longer than two hours, lorazepam has worked well for prolonged sedation.

To reiterate, this article is not intended to be a comprehensive review of all anxiolytic medications available. Examples of drugs for different length procedures based on the dental and medical literature were discussed. For example, diazepam has been recommended for dental anxiety in several references, but the author discussed triazolam and lorazepam.[22-24] Diazepam has a duration of action of six to eight hours, but it also has a primary half-life of 20 to 80 hours and 40 to 120 hour half-life for active secondary metabolites. In addition, two head-to-head comparisons of diazepam and triazolam found triazolam to be a more effective anxiolytic agent.[25,26]

For many patients, needed dental procedures are delayed or avoided due to anxiety, and quality of life is compromised in the long term. This article has attempted to provide practical oral sedation premedication protocols. Hopefully, this information will help dentists treat slightly and moderately apprehensive patients without the requirement of state conscious-sedation permits or certificates. ■■■■

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Table 13

SAMPLE TRIAZOLAM PRESCRIPTIONS

Triazolam comes in strengths of 0.125 mg and 0.25 mg

I. Morning appointments

Patients are instructed to reduce the number of tablets they take in the morning if they feel sedate when they wake up in the morning.

Rx #1

Patient characteristics:
Age 45
Weight 160 lbs.
Health is good
Appointment in the morning

Rx	Triazolam 0.125 mg
Disp	Tabs #4
Sig	Take two tablets at bedtime the night before dental procedure and two tablets one hour before dental procedure. This is for sedation, and you need to be accompanied by a responsible companion. Do not drive.

Rx #2

Patient characteristics:
Age 68
Weight 160 lbs.
Health is good
Appointment in the morning

Rx	Triazolam 0.125 mg
Tabs	#2
Sig	Take one tablet at bedtime the night before dental procedure and one tablet one hour before dental procedure. This is for sedation, and you need to be accompanied by a responsible companion. Do not drive.

II. Afternoon appointments

Rx#3

Patient characteristics
Age 45
Weight 160 lbs.
Health is good
Appointment is in the afternoon

Rx	Triazolam 0.25 mg
Tabs	#1
Sig	One hour before your dental appointment, place tablet under tongue and do not swallow for at least two minutes to allow tablet to dissolve. This is for sedation, and you need to be accompanied by a responsible companion. Do not drive.

Rx #4

Patient characteristics
Age 68
Weight 160 lbs.
Health is good
Appointment in the afternoon

Rx	Triazolam 0.125 mg
Tabs	#1
Sig	One hour before dental treatment, place tablet under tongue and do not swallow for at least two minutes to allow tablet to dissolve. This is for sedation, and you need to be accompanied by a responsible companion. Do not drive.

Table 14

SAMPLE LORAZEPAM PRESCRIPTIONS

Lorazepam comes in strengths of 0.5 mg, 1.0 mg, and 2.0 mgs

I. Morning appointments

Patients are instructed to reduce the number of tablets they take in the morning if they feel sedate when they wake up in the morning.

Rx #1

Patient characteristics:
Age 45
Weight 160 lbs.
Health is good
Appointment in the morning
Rx Lorazepam 0.5 mg
Tabs #5
Sig Take two tablets at bedtime the night before dental procedure and three tablets two hours before dental procedure. This is for sedation, and you need to be accompanied by a responsible companion when you come to the office. Do not drive.

Rx #2

Patient characteristics:
Age 68
Weight 160 lbs.
Health is good
Appointment in the morning
Rx Lorazepam 0.5 mg
Tabs #3
Sig Take one tablet at bedtime the night before dental procedure and two tablets two hours before dental procedure. This is for sedation, and you need to be accompanied by a responsible companion when you come to the office. Do not drive.

II. Afternoon appointments

Rx#3

Patient characteristics
Age 45
Weight 160 lbs.
Health is good
Appointment is in the afternoon
Rx Lorazepam 0.5 mg
Tabs #3
Sig Take three tablets two hours before dental procedure. This is for sedation, and you need to be accompanied by a responsible companion when you come to the office. Do not drive.

Rx #4

Patient characteristics
Age 68
Weight 160 lbs.
Health is good
Appointment in the afternoon
Rx Lorazepam 0.5 mg
Tabs #2
Sig Take two tablets two hours before dental procedure. This is for sedation, and you need to be accompanied by a responsible companion when you come to the office. Do not drive.

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To request a printed copy of this article, please contact / Robert L. Merin, DDS, MS, 6342 Fallbrook Ave., Suite 101, Woodland Hills, Calif., 91367.

CLINCAL UPDATE

Local Anesthetics: Dentistry's Most Important Drugs, Clinical Update 2006

STANLEY F. MALAMED, DDS

ABSTRACT

Local anesthetics are the safest and most effective drugs in medicine for the control and management of pain. They also represent the most important drugs in dentistry. Today, dentistry has a spectrum of local anesthetics that permit pain control to be tailored to the specific needs of the patient: short-, intermediate-, and long-acting drugs. Bupivacaine has become a standard part of the armamentarium for postsurgical pain control while articaine has become the second-most used local anesthetic in the United States since its introduction in 2000. Despite an increase in anecdotal reports of paresthesia since articaine's introduction there is, as yet, no supporting scientific evidence.

Local anesthetics form the backbone of pain control techniques in dentistry. Their introduction, by Karl Koller and Sigmund Freud (topically), and William Halsted (injectably) in 1885, revolutionized the practice of surgery, both dental and medical. Prior to their introduction, general anesthesia, was the only viable method of managing surgical pain. Administration of drugs that depressed the central nervous system to the point that the patient lost consciousness allowed the surgeon to successfully complete otherwise painful and potentially lethal procedures. During general anesthesia, the pain impulse propagated during surgical manipulation is carried along neurons to the patient's brain. Because of central nervous system depression, the patient is unable to outwardly react to this stimulation, e.g., no visible movement. However, vital functions — such as blood pressure, heart rate — and respiratory rate do respond to this nociceptive stimulus. Slight elevations in vital signs are noted at the time of incision and other manipulations.

Author / Stanley F. Malamed, DDS, is a professor of anesthesia and medicine, University of Southern California School of Dentistry, in Los Angeles.

Disclosure / Stanley F. Malamed, DDS, is a consultant to Dentsply (Astra); Kodak (Cook-Waite); and Septodont, all manufacturers of dental local anesthetics.

BY THE EARLY 1900s, REPORTS OF SERIOUS ADVERSE REACTIONS TO COCAINE AND EPINEPHRINE HAD APPEARED IN BOTH LAY AND MEDICAL LITERATURE.

To minimize these responses, increased concentrations of inhaled anesthetic gases or larger doses of injected drugs must be used. However, administration of larger doses is associated with an increased risk of potentially significant adverse drug effects.

The introduction of an injectable local anesthetic, cocaine with epinephrine 1:50,000, permitted surgeons for the first time to operate painlessly on a conscious human being. In 1885, Dr. William Stewart Halsted (1852-1922) administered an inferior alveolar nerve block for the surgical removal of the nerve. Not surprisingly, cocaine was hailed as a "wonder drug." From 1885 until the beginning of the 20th century, cocaine with epinephrine was the drug of choice in dental and surgical pain control. However, by the early 1900s, reports of serious adverse reactions to cocaine and epinephrine had appeared in both lay and medical literature. Halsted himself became addicted to cocaine, injecting himself as a means of maintaining energy for his ever-increasingly busy schedule of surgery, writing, and lecturing. Cocaine is unique amongst all local anesthetics in that it possesses stimulatory actions on the cardiovascular system, producing elevations in heart rate and blood pressure, as well as sensitizing the myocardium and provoking potentially lethal dysrhythmias, e.g., ventricular fibrillation. As cardiopulmonary resuscitation did not exist until 1960, the occurrence of cardiac arrest was uniformly fatal.

Development of Local Anesthetics (Esters)

In 1904 in Germany, Alfred Einhorn (1856-1917) synthesized procaine. Introduced into medicine and dentistry at that time, the drug became the most widely used local anesthetic in the world. Its proprietary name, Novocain, remains synonymous with the lay public as "the" dental local anesthetic.

Procaine, like cocaine, is an amino-ester local anesthetic. The ester-type local anesthetics work, as do virtually all other local anesthetics, by diffusing through the lipid-rich nerve membrane and then blocking Na^+ channels, thus producing a nondepolarizing nerve block. Clinical activity, anesthesia, is terminated when the drug diffuses out of the Na^+ channels entering into the cardiovascular system where it is then redistributed to other areas in the body. Biological transformation, also known as metabolism and detoxification, of the amino-esters starts with their entry into the cardiovascular system as the enzyme plasma pseudocholinesterase cleaves the molecule. Procaine became the "standard of comparison," the "gold standard" to which all new local anesthetics were compared.

Procaine with epinephrine was popular because its duration of pulpal anesthesia met the needs of the dental profession in the early to mid-1900s. With foot-treadle handpieces, the typical dental appointment was approximately 30 minutes in length, the duration of pulpal anesthesia expected with procaine and epinephrine (1:50,000).

Though other amino-ester local anesthetics, such as tetracaine and propoxycaine, were available, procaine remained the predominant local anesthetic used in both dentistry and medicine.

Development of Local Anesthetics (Amides)

By the mid-1940s, dentistry was becoming disgruntled with the available local anesthetics. Introduction of the belt-driven handpiece, as well as other therapeutic advances, led to longer treatment periods and the realization that procaine + epinephrine was no longer an adequate anesthetic, both in duration and depth of anesthesia, for many dental procedures. Additionally, procaine possesses the slowest onset of the clinical available local anesthetics, approximately 10 to 15 minutes. One final factor came to bear, the development of allergy to the broad class of ester-type local anesthetics.

In 1943 in Sweden, Nils Lofgren synthesized a new class of local anesthetic, developing lidocaine, the first amino-amide. Marketed in 1948 under the proprietary name Xylocaine, it quickly became a favorite of the dental profession, replacing procaine as the "gold standard." Lidocaine's onset of action was measurably faster (three to five minutes); its duration of anesthesia (pulpal) was longer and more profound; and it provided more consistently reliable anesthesia than did the esters.

In 1960, the second amide was introduced, mepivacaine (Carbocaine), followed in 1965 by prilocaine (Citanest).

Use of the esters declined precipitously during this time and, in 1996, the last remaining formulation of an ester local anesthetic (procaine + propoxycaine) in dental cartridges ceased to be manufactured.

Lidocaine, mepivacaine and prilocaine, combined with a vasopressor (epinephrine or levonordefrin) provide reliable and profound pulpal anesthesia for approximately 60 minutes (with a duration of soft tissue anesthesia lasting from three to five hours). As the dental profession turned to high-speed handpieces and more involved procedures, the length of a typical appointment increased. The American Dental Association's Annual Survey of Dental Practice in 2002 noted that the typical general dentistry patient received treatment for approximately 44 minutes.[1]

TO DATE, ONLY ONE CLINICAL TRIAL HAS DEMONSTRATED ANY SUPERIORITY OF ARTICAINE TO ANY OTHER LOCAL ANESTHETIC.

These three amide local anesthetics meet the anesthesia needs of the vast majority of dental patients and remain amongst the most popular local anesthetics used in dentistry today. (Mepivacaine "plain" provides pulpal anesthesia of from 20 to 40 minutes along with soft tissue anesthesia lasting approximately two to three hours).

The 1970s saw an increase in the number of surgical procedures, along with an increase in the length of many other dental procedures. Along with the surgery came a pressing need for effective postsurgical pain control. Dentistry turned to two local anesthetics, bupivacaine and etidocaine, both of which had been developed in medicine to aid in exactly this area, providing up to 12 hours of soft tissue anesthesia. Initially available only in multiple dose vials, bupivacaine 0.5 percent with epinephrine 1:200,000 (proprietary name: Marcaine) was released in dental cartridges in 1983, followed in 1988 by etidocaine 1.5 percent with epinephrine 1:200,000 (Duranest). Though accounting for only a small percentage of dental local anesthetic usage in the United States and Canada, these drugs have been extremely useful, in conjunction with orally administered nonsteroidal anti-inflammatory drugs, in the prevention or management of postoperative pain. Bupivacaine became the more preferred formulation and, in 2002, etidocaine was withdrawn from the U.S. market.

In 1969, carticaine was synthesized and, in 1976, introduced in German dentistry. The generic name was changed to articaine several years later. Articaine, with epinephrine, provides a duration of pulpal and soft tissue anesthesia similar to that noted with lidocaine, mepivacaine and prilocaine with vasopressor, approximately one hour pulpal and three to five hours of soft tissue. Introduced into Canada in 1983, and the United States in 2000, articaine has become a very popular local anesthetic.

Currently Available Local Anesthetic Formulations

Table 1 lists the currently available dental local anesthetic formulations in North America and **Table 2** lists the approximate share of the U.S. dental market for each local anesthetic.

Bupivacaine

At this time, bupivacaine is the only long-acting local anesthetic available in dental cartridges in North America. Despite its relatively slow onset (six to 10 minutes) bupivacaine is a very important local anesthetic in the prevention of postoperative (e.g. surgical) pain. Administered in conjunction with oral (po) NSAIDs it is possible, and highly likely, that the perioperative period for most patients will be comfortable. A recommended regimen is presented in **Table 3**.

In May 2006 it was announced that Marcaine would no longer be available in dental cartridges, leading to a significant degree of consternation amongst dental surgeons.[3] Though its proprietary form, Marcaine, remains available in a multiple dose vial, the drug is once again available in dental cartridges, as the generic drug bupivacaine (0.5 percent with 1:200,000 epinephrine), from Hospira. It may be ordered from either Patterson Dental (www.pattersondental.com) or Sullivan-Schein (www.sullivanschein.com). Marcaine, in dental cartridges, was scheduled to become available again in November 2006.

Articaine

Articaine under its proprietary names Septocaine (United States), Zorcaine (United States), Ultracaine (Canada), Septanest (Canada) and Astracaine (Canada) has become a very popular local anesthetic in North American dentistry since its introduction into Canada in 1983 and the United States in 2000. Little to no evidence-based medicine exists demonstrating any superiority of articaine over other available local anesthetics. However dentists in clinical practice have claimed that articaine possesses properties that other local anesthetics don't. Included in these admittedly anecdotal reports are claims that articaine 1) works faster, 2) works "better," 3) "I don't miss as often," and 4) "gets patients numb when other local anesthetics fail."

Since its introduction in Germany in the early 1970s, articaine has been compared in double-blinded, randomized, controlled clinical trials to each of the other available local anesthetics. To date, only one clinical trial has demonstrated any superiority of articaine to any other local anesthetic.[4] Phase 3 clinical trials performed at 29 sites in the United States and United Kingdom in the late 1990s compared articaine to lidocaine in more than 1,400 patients undergoing dental care.[5,6] The summary of the trials stated there were no clinically significant differences between articaine and lidocaine, and concluded that articaine was a "safe and effective local anesthetic" for dentistry.

Yet, despite a lack of evidence demonstrating its superiority articaine continues to become increasingly popular in the United States. Endodontists have become enamored with the drug as a more definitive means of achieving profound anesthesia to permit painless pulpal extirpation in "hot" mandibular molars — the most difficult teeth to anesthetize successfully, yet again in the absence of any published clinical trials demonstrating this advantage.

Table 1

CURRENTLY AVAILABLE DENTAL LOCAL ANESTHETIC FORMULATIONS

Local anesthetic	%	Vasopressor	Mgs. LA/ cartridge	Onset, minutes	Expected duration	
					Pulpal, minutes	Soft tissue, hours
Articaine	4	Epinephrine 1:200,000 1:100,000	 72 72	 2-3 2-3	 60 60	 3-5 3-5
Bupivacaine	0.5	Epinephrine 1:200,000	9	6-10	90-180	3-12
Lidocaine	2	 Epinephrine 1:50,000 / 1:100,000	36 36	3-5 3-5	10 60	1-2 3-5
Mepivacaine (Canada)	3 2	 Levonordefrin 1:20,000 epinephrine 1:100,000	54 36 36	3-5 3-5 3-5	20-40 60 60	2-3 3-5 3-5
Prilocaine	4	 Epinephrine 1:200,000	72 72	3-5 3-5	5-10 infiltration 40-60 nerve block 60-90	2-3 3-8

One reason for this difficulty in demonstrating articaine's alleged superiority to other local anesthetics is simply that the other available drugs are very effective in general. Unlike in the late 1940s when the "new" drug, lidocaine, was compared to the "old" drug, procaine, and was shown to be demonstrably superior in all clinical measurements, the amide local anesthetics in use today are "darned good." Indeed, prior to the introduction of articaine in 2000 (United States) was there, in dentistry in the United States, an urgent need for "better" local anesthetics? The answer is a definite "No."

The occasional patient might prove difficult to "numb," and infected mandibular molars might be difficult to satisfactorily anesthetize, problems which were much more common prior to the introduction of the amides. But overall, dentists were quite satisfied with the rapid onset, depth (profoundness), duration, and consistency (reliability) of anesthesia produced by the entire class of amide local anesthetics. It is difficult, if not impossible, to demonstrate to a level of statistical significance (evidence-based medicine) in an economically sound clinical trial that articaine is superior to any other commonly used amide local anesthetic.

Along with the "good" there is always the "bad," and articaine is no exception. Haas and Lennon published the results of voluntary reports by dentists to an insurance plan in Ontario, Canada, concluding that 4 percent local anesthetics have a greater reported incidence of paresthesia than 2 percent or 3 percent local anesthetics.[7] Though admittedly a preliminary survey, many have taken the results as the "gospel chipped in stone" — as definitive proof that 4 percent local

Table 2

LOCAL ANESTHETIC USAGE IN THE UNITED STATES, 2005 (ESTIMATED)

Local anesthetic	% of U.S. market (estimated)
Lidocaine HCl	47
Articaine HCl	26
Mepivacaine HCl	15
Prilocaine HCl	6
Bupivacaine	1

Data from Septodont, Inc. (October 2006)

Table 3

PERIOPERATIVE PAIN MANAGEMENT REGIMEN

NSAID po one hour prior to scheduled start of procedure: e.g., ibuprofen 800 mg[2]
LA of choice for periprocedural pain control: e.g., articaine, lidocaine, mepivacaine or prilocaine, with vasopressor
Administration of bupivacaine: at surgical site, at the conclusion of the procedure, if the procedure is prolonged (e.g., one hour or more) at surgical site, immediately following administration of LA for pain control, if the procedure is of short duration (<30 minutes)
Continuation of NSAID po for recommended duration of days e.g., ibuprofen 800 mg tid
Postoperative telephone call to patient early evening of surgery Review postoperative instructions

anesthetics in general, and articaine in particular, are associated with a greater risk of paresthesia. At this time, there is absolutely no scientific evidence to demonstrate there is a greater risk of paresthesia associated with administration of a 4 percent local anesthetic.

All reports of paresthesia have been anecdotal. Evidence-based research does not exist.

When evaluating reports of paresthesia following local anesthetic administration (in nonsurgical cases), first determine the distribution of nerve involvement. The overwhelming majority of reported instances of paresthesia occur in the mandible following a traditional inferior alveolar nerve block. A Medline search for reports of paresthesia following maxillary dental procedures from 1966 to 2006 produced but one paper, reporting paresthesia of the incisive papilla following the P-ASA injection.[8] In the Haas-Lennon survey, all of the 143 reported nonsurgery-related cases of paresthesia were mandibular, with the tongue (lingual nerve) most frequently involved.[7] Pogrel similarly reported that although almost all reported paresthesia cases in dentistry develop following inferior alveolar nerve block, more than 70 percent involve the lingual nerve.[9,10] Forty-two of 52 Danish patients reported by Hillerup and Jensen demonstrated damage to the lingual nerve, which was associated with all available local anesthetic formulations.[11] Twelve reported injury to the inferior alveolar nerve.

Though there are possible causes for this preponderance of reported lingual nerve paresthesia, "there appears to be no documentation in the literature as to possible explanations for this."[10]

Some possible etiologies include: 1) direct needle trauma to the lingual nerve; 2) hemorrhage, either extraneural or intraneural; 3) edema, either extraneural or intraneural; and 4) chemical neurotoxicity of the local anesthetic drug, vasopressor, and/or other ingredients of the local anesthetic cartridge.

Paresthesia has not been reported following alternative mandibular nerve block techniques such as the Gow-Gates or Vazirani-Akinosi (closed mouth) mandibular nerve blocks.

Articaine is administered frequently in nondental surgeries, such as in ophthalmology, orthopedic surgery, and spinal anesthesia.[12-14] There are no reported cases of paresthesia in the medical literature[15] (Medline search 1966-2006).

In a recent review of local anesthetic-associated paresthesia, Missika and Khoury stated that "a clear causal relationship has not been established in the literature between the anesthetic agent and neurological complications, such as paresthesia."[16]

Given the present level of scientific evidence or, more accurately, the lack thereof, linking 4 percent local anesthetics with an increased risk of neurotoxicity, it seems, to this author, that advisories to dentists from agencies suggesting that it might be prudent to avoid the use of articaine in mandibular nerve blocks is unjustified at this time.[17,18]

However, as in all dental treatments and therapies, it is ultimately the doctor who must make the decision as to whether or not to use a 4 percent local anesthetic, such as articaine, in inferior alveolar (mandibular) nerve block anesthesia. This decision should follow assessment of the benefits to be accrued from use of the drug versus the potential risks associated with its administration. Only when, in the mind of the doctor, the benefit clearly outweighs the risk should the drug be administered.

Remember, that prior to the introduction of articaine into the United States in 2000, local anesthesia in dentistry was not a problem. Successful pain control can still be achieved with other local anesthetics if the doctor feels the risk outweighs the benefit.

Summary

Local anesthetics represent dentistry's most important drugs. Their introduction revolutionized the practices of both dentistry and medicine. Local anesthetics are the safest and the most effective drugs in all of medicine for the prevention and management of pain in the perioperative period.

The amide local anesthetics available today provide the doctor with a broad range of durations of action, from short: (mepivacaine 3 percent) to long (bupivacaine 0.5 percent + epinephrine 1:200,000), as well as a number of formulations providing approximately one hour of pulpal anesthesia.

Bupivacaine, a long-acting local anesthetic, is an important component in the regimen for the management of postoperative pain.

Articaine, the most recent addition to the dental local anesthetic armamentarium, has become a very popular drug primarily as a result of anecdotal clinical reports from doctors using it who find it to have properties not observed in the more traditional local anesthetics. Allegations that 4 percent local anesthetics are associated with a greater risk of paresthesia are based solely on anecdotal reports and have no scientific justification. ■■■■

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To request a printed copy of this article, please contact / Stanley F. Malamed, DDS, University of Southern California School of Dentistry, University Park, MC-0641, Los Angeles, CA 90089.

Club Meds

One of the first duties of a physician is to educate the masses not to take medicine.
— William Osler (1848-1919)

Sorry Doc, but the first duty of the masses is to seek solace, health, euphoria, and recreation in as much medicine as they can get their hands on.

When Sir William Osler, the best-known physician in the English-speaking world at the turn of the century, died in 1919, the average family's medicine cabinet contained little more than aspirin, mustard plasters, and Lydia Pinkham's "Pink Pills for Pale People." Today, those people are, with the exception of myself, busy taking advantage of their pre-paid Eternal Rest contracts. Obviously, we needed more medications and the pharmaceutical industry has not failed to deliver after due deliberation by the Federal Drug Administration (Motto: We'll Think About It).

Confronted with today's 40-pound issue of the *Physicians' Desk Reference* and its detailed description of every pill, capsule, extract, and elixir known to mankind, Sir William would have plotzed. His advice to physicians to educate the masses not to take medicine, if taken literally, would have plunged the nation into economic chaos.

Take the Centers for Medicare and Medicaid Services, which spent $515 billion in 2005 — that's 21 percent of the federal budget and about $21 billion more than all defense spending. These figures are Mark McClellan's, Medicare/Medicaid chief, whose resignation became effective in October. When the federal government spends $515 billion, somebody is receiving the same

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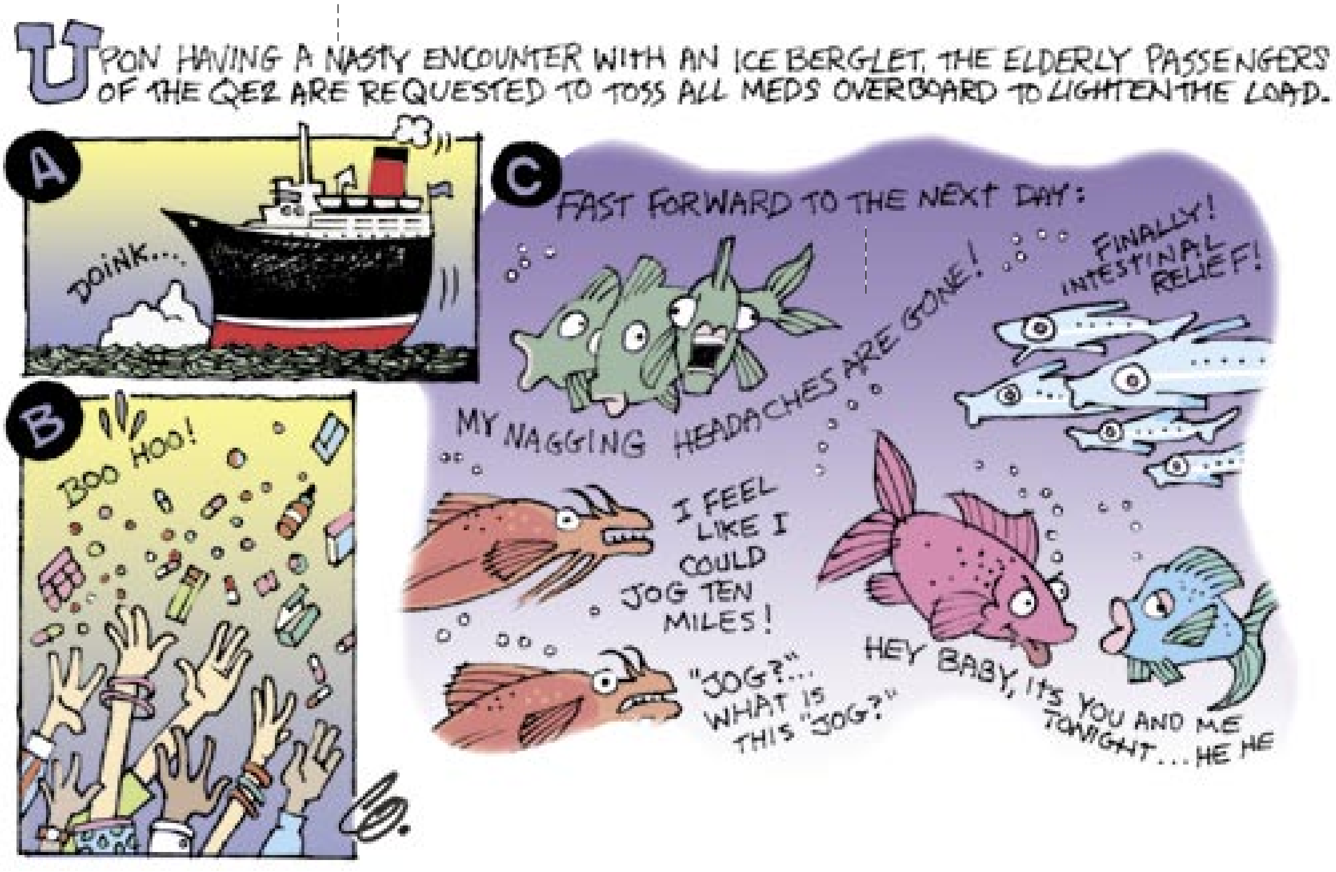

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amount. Not you and me, of course, but obviously there is big money in sickness. A nation of well people would be disastrous to our economic wellness. Get lost General Motors — as Merck et al. goes, so goes the country.

The moment you start receiving those comical "Over-the-Hill" birthday cards with the black border, you are but moments away from the strangely satisfying Saturday night ritual of restocking the little seven-day compartmented boxes with your "meds" for the coming week. As an octogenarian who has been over more hills than Lewis and Clark, may I suggest that peer-group discussions of one's meds is right up there with the equally fascinating comparisons of ailments the medicines are intended to alleviate.

Lining up the assorted bottles filled with the variously colored, multishaped tablets and capsules in front of me, I am self-righteous as a new nonsmoker. Plink, plink, plink go the meds as they drop into their Sunday-through-Saturday compartments. Several of them are prescription drugs, the rest assorted vitamins and minerals. All are washed down with blind faith, tainted slightly by the realization that, unless I am addicted to a mashed potato-gravy diet, the vitamins are probably a waste of money. The glucosamine/chondroitin tablet is roughly the size of a medication administered by veterinarians to ailing horses. It has resulted in no appreciable increase in my ability to climb and descend stairs or gallop a couple of furlongs even though I have sluiced down enough tablets to sink the QE2. Which, by the way, has a shipboard population weighted heavily in the mature age category, i.e., those with the platinum plastic to satisfy the fare. Should the ship ever be in danger of sinking, deep-sixing the old folks' medications would be the first act in saving the vessel.

But we have faith, we older citizens, along with our fond memories of Glenn Miller and paid-for automobiles. The pharmaceutical industry has never let us down except in a few cases settled out of court, or where litigation is pending and the autopsies are inconclusive. Should their R&D division come up with a cure for which there is yet no known disease, count us in to take it. Nothing is more reassuring to a veteran pill-popper than the parting words of a primary care server who has been gifted with a new drug by a pharmaceutical rep, "Here, try this."

Elbert Hubbard, American philosopher, writer, and publisher (1856-1915) accurately noted long ago, "The worst thing about medicine is that one kind makes another necessary." The pharmaceutical industry begs to differ: "The best thing about medicine is that one kind makes another necessary." Perhaps H.L. Mencken summed it best: "One of the chief objects of medicine is to save us from the natural consequences of our vices and follies."

In the meanwhile, Sir William, rest easy. Life expectancy is up 23 percent from your day and assisted-living facilities are making money hand over fist. ■■■■