CDA

Respiratory Problems
Herbal Supplements
Local Anesthesia

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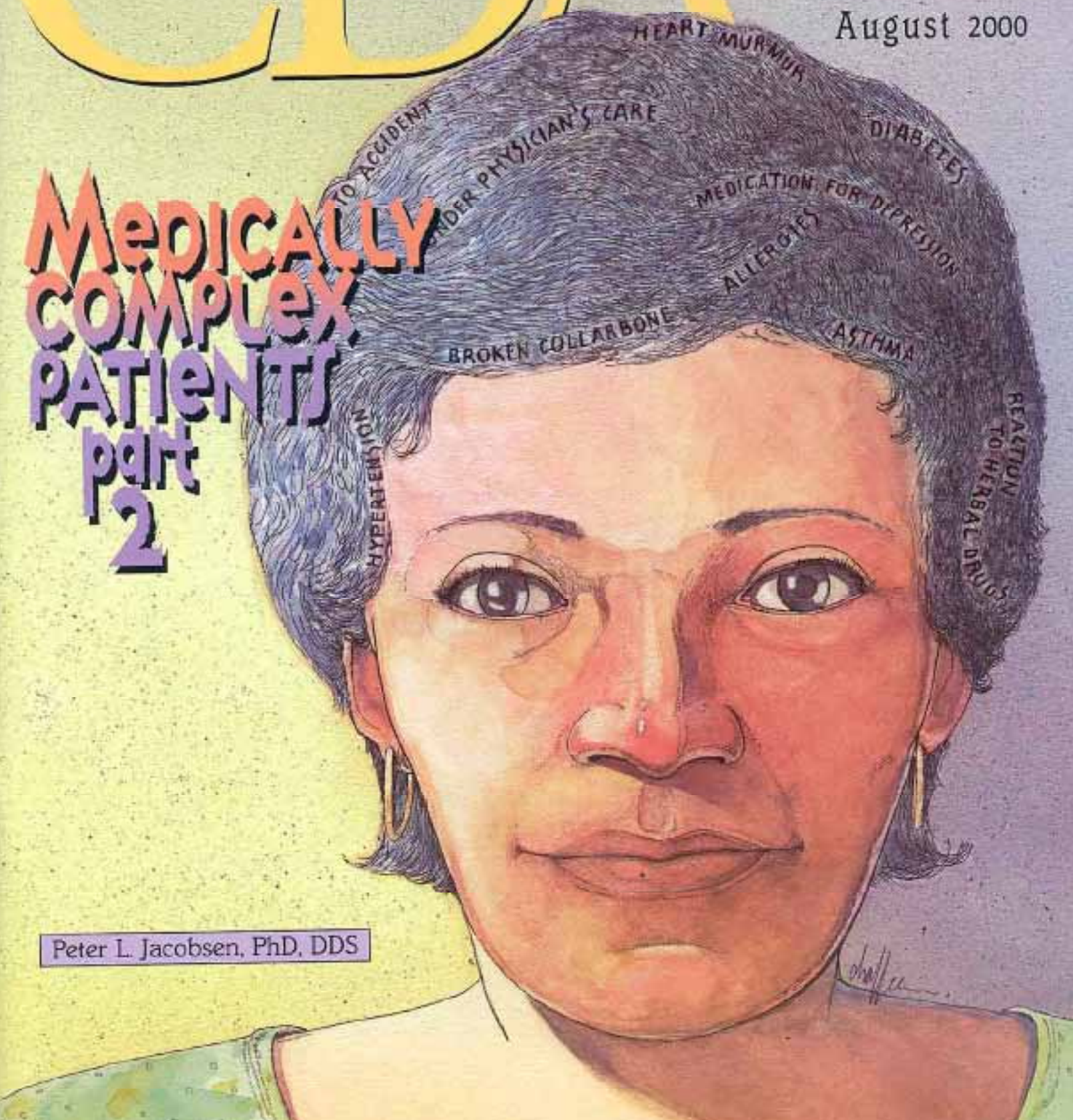
Medically Complex Patients part 2



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DEPARTMENTS

FEATURES

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Building Our Resources

Jack F. Conley, DDS

As has been documented here and elsewhere in CDA publications in recent months, the California Dental Association has been engaged in a comprehensive strategic planning process this year. Once that process is complete, it will be time to actively engage the necessary association resources to a carry out the mission and pursue the goals and objectives that result from this ambitious undertaking.

In addition to annual dues, there are critical resources necessary to the operation of this and any other membership organization. In no particular order of importance, these resources include a talented staff and management team, volunteers to serve in leadership roles from committee members to officers, and financial resources to carry out not only organizational operations, but also the needs and wants of the membership. The staff and management are in place. Our present discussion will center on deficiencies we believe exist in the latter two categories, inadequate numbers of member volunteers and inadequate financial resources to carry out some of the most highly valued membership wants.

Let's address the issue of volunteers first. This is not a new problem. In fact, it was discussed in this column in May 1996 ("Vanishing Volunteers") and again in June 1998 ("Commitment -- A Vanishing Commodity"). Continuing a disturbing downtrend, the number of volunteers submitted for consideration for service on association councils, committees, and other leadership roles in the period immediately preceding the 2000 deadline for submission, again showed that inadequate numbers of members feel that they have either the time for or the interest in volunteering their service. As in the recent past, it is our view that such factors as the practice time needed to operate a profitable business, elimination of educational debt load, and devotion to family needs top the list of reasons many either do not make themselves available to serve or decline if asked.

The need for volunteer members is crucial, however. The work of organized dentistry depends on an adequate number of volunteers, qualified by the experience they receive in the course of service over time. When members and nonmembers have been surveyed about what they expect from dues-paying membership in organized dentistry, they often criticize the lack of aggressive pursuit of issues and policies that they believe would benefit their business interests. They want to see more evidence of proactive advocacy on issues they feel are important to their practices. One of the factors that would aid a more proactive approach would be a larger cadre of qualified volunteers, enabling dentistry to gain a more visible and effective representation in hearings or other venues on issues of professional or public importance.

Year 2000 CDA leadership has favored initiatives that would provide a faster track into volunteer leadership activity, in hopes that it would encourage younger

members to participate earlier, move through leadership activity faster, with a shorter total time commitment due to shorter terms of service. The theory is that a lesser time commitment would be more attractive to many individuals in today's competitive, time-intensive business environment. Only time will tell whether this type of incentive will encourage in particular the younger practitioners, whose professional careers will be most affected by new policies and regulations over the many years they will be in practice. These initiatives illustrate the efforts being made to attract newer members into participating in their profession -- a responsibility that has been lacking with too many members in recent years. We believe that greater participation by the membership will be healthy for organized dentistry. Increased volunteerism will result in greater success in achieving dentistry's goals and. at the same time, improve the spirit of members toward their organization and its perceived value. It is important that the trend toward fewer participants in the process be reversed!

Many members mistakenly believe that dues enable the association to cover the expenses of all activities important to serving the membership's needs. That is incorrect. As was previously mentioned, one of the frequent criticisms faced by the association is the failure to be proactive by advocating appropriate public policy that will also be in the best interests of dentistry. Some members are critical because they believe dentistry is too often placed in a defensive posture in regard to regulatory activity.

This is where CalDPac comes in. This is a place where too few members (only 37 percent) have been providing the financial support that can make a difference in achieving dentistry's goals over the long term. CalDPac contributions are voluntary -- but they shouldn't be considered voluntary by any dentist who wants to see successful advocacy on the part of his or her profession. Unions and professional organizations that have mandatory fees are well-positioned to develop a presence on issues they believe will further their causes. With the current low level of member support, it is not possible for dentistry to achieve this type of presence.

Any dentist who is dissatisfied with the representation he or she believes dentistry is achieving and is not now contributing to CalDPac should immediately make a commitment to contribute NOW and every year when renewing membership.

In the 21st century, professional membership requires more effort than just contributing dues once a year. It also requires that a greatly increased percentage of members contribute to building the real resources of the organization. Volunteer service activity and financial contributions to aid the advocacy efforts are essential to a healthy contemporary professional organization.

Organized dentistry is much like the business of dentistry in the changes that it has experienced in the past quarter century. Some dentists were able to become successful without strong adherence to business principles and management practices some 25 years ago. The competitive environment today requires the successful dentist to develop good patient relationships, management, and marketing skills in addition to the treatment skills developed in school.

Organized dentistry did not require much more than dues support from the average member in exchange for membership services 25 years ago. Today, the profession really does require both volunteer service and voluntary financial support from members to build the human and financial resources necessary for CDA to achieve status as a successful advocate for dentistry.

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AHA Releases New Statement On Oral Health and Heart Disease

In a newly released advisory that it hopes will clarify current confusion, the American Heart Association notes that although oral health is a factor in reducing the risk of bacterial endocarditis, ordinary dental treatment has not been shown to prevent chronic coronary heart disease. Following is the text of the full statement:

American Heart Association Science Advisory: American Heart Association Statement On Oral Health and Cardiovascular Disease

Good oral health is important in reducing the risk for acute cardiovascular disease such as bacterial endocarditis. There is limited and inconclusive evidence that oral bacteria may play a role in chronic cardiovascular disorders such as coronary artery disease. Whether this relationship will eventually prove to be significant, as one of the many factors in the development of cardiovascular disease, or of no significance is presently unknown. Regular professional and home dental care can reduce acute cardiovascular risk from oral microorganisms; neither routine nor extraordinary dental treatment procedures have been documented to prevent chronic coronary heart disease. The 1997 American Heart Association guidelines for the prevention of bacterial endocarditis in at-risk dental patients remain in effect as recommended.

Providing Dental Care for Disabled Patients

By David G. Jones

A teenage girl arrived at a dental office grimacing with pain. She pointed to one of her teeth but couldn't answer the receptionist's questions about when the problem began, what medications she was taking, or how she would pay for treatment. She had been profoundly deaf since childhood and couldn't communicate without a sign language interpreter.

Her plight is but one example of what can happen when someone with a disability arrives at a dental office for treatment. Even though the federal Americans With Disabilities Act since January 1992 has required dentists to serve people with disabilities, the young girl was refused service because the dentist refused to pay for an interpreter.

Since dental offices are considered public accommodations under the Act, dental office, like any other public business, must be made accessible to people with disabilities.

"Certainly dentistry is among the categories identified in the statute to which people have a civil right to access," said Josephine Black, executive director of the Independent Living Resource Center, a nonprofit agency that provides assistance for people with physical and sensory disabilities in California's central coast region. "This is a civil rights access issue, not a privilege. Dental and medical offices have an obligation under the law to provide accommodation."

Black's regional office, based in Santa Barbara, provides services to about 1,400 people with disabilities each year and helps them with removal of barriers in the community, including architectural, communication, and attitudinal. Amy Hedberg, an advocate and communications assistant specialist in Black's office, said the teenager who was refused service was one of two deaf sisters who needed an interpreter to go to doctor and dental appointments.

"I was referred to two dentists in the area by the girls' high school interpreter," Hedberg said. "I called both of them and explained that I needed to get authorization for an interpreter. They both said they never had to pay for this before and saw no reason to start. One of them hung up on me," she said.

According to information provided by the American Dental Association's legal division, the Americans With Disabilities Act also requires dentists to make reasonable modifications to their practices to facilitate access. The modifications may include rearranging part of the office, as well as changing policies that may have the effect of excluding disabled people from receiving care. The Act also requires dentists to provide auxiliary aids and services at their expense to disabled patients. In the case of the young woman who was deaf, the auxiliary aid could be a sign language interpreter, a note taker, or a qualified reader.

"There are also a number of issues related to physical access to dental offices if the patient is a wheelchair user," Black said.

According to Black, some dentists say that Medi-Cal doesn't cover their expenses, so paying for extra services to provide access for the disabled causes them to lose money.

"The Americans With Disabilities Act isn't looking to bankrupt any small business like a dental office," Black said, "but the practice can probably afford a $40 interpreter fee."

To ensure that their practices are ready to provide access to the disabled, dentists should allow for accommodation in their office budgets. Forms may have to be printed in large print format or read to someone who is blind. Some expenses are one-time only, like installing a wheelchair ramp, but there may be recurring

expenses such as supplies that have to be planned for.

"This is about making access for disabled people like a normal person would, protecting and making decisions about their health," Black said. "It's hard to deal with door slamming. We have often cut our fees for interpreters, but some dentists don't even want to deal with it. It's a lack of awareness and a lack of sensitivity that is modifiable."

CDA President Kent Farnsworth believes that the reason members fail to adhere is not because they don't want to comply.

"I think it's more that they aren't always aware of what their responsibilities are under the Americans With Disabilities Act," he said.

Farnsworth said that if compliance requirements seem onerous, there are ways to appeal.

"But it has always been in dentistry's best interest to accommodate those who are less fortunate and have obstacles to receiving care," he said. "It's incumbent on us as small-business people to conform to the law of the land."

Members who want to find out more about what they're required to do under the Americans With Disabilities Act can log onto the Department of Justice's Americans With Disabilities home page at http://www.usdoj.gov/crt/ada/adahom1.htm. Telephone support is available from both the Department of Justice at (800) 514-0301 and from regional technical assistance centers for small businesses at (800) 949-4ADA.

Black said that for disabled people, the Act means trying to level the playing field. "They want to finally go where everyone else has gone before." she said.

First Survey of Human Genome Completed

The international Human Genome Project has completed initial sequencing of the human genome. This mapping of the molecular blueprint for human beings is expected to lead to a new era of molecular medicine for the prevention, diagnosis, treatment, and cure of disease.

The initial sequence represents only the first step in the full decoding of the genome, because most of the individual genes and their specific functions must still be deciphered and understood. Tens of thousands of genes have already been identified, including some related to deafness, kidney disease, breast cancer, hereditary skeletal disorders, hemorrhagic stroke and diabetes

Information from the initial sequence alone, however, is expected to generate significant contributions to health care. Scientists hope to use the working draft of the human genome to:

- Alert patients that they are at risk for certain diseases. Once scientists discover which DNA sequence changes in a gene can cause disease, healthy people can be tested to see whether they risk developing conditions such as diabetes or prostate cancer later in life. In many cases, this advance warning can be a cue to start a vigilant screening program, to take preventive medicines, or to make diet or lifestyle changes that may prevent the disease.
- Reliably predict the course of disease. Diagnosing ailments more precisely will lead to more reliable predictions about the course of a disease. For example, a genetic fingerprint will allow doctors treating prostate cancer to predict how aggressive a tumor will be. New genetic information will help patients and doctors weigh the risks and benefits of different treatments.
- Precisely diagnose disease and ensure the most effective treatment is used. Genetic analysis allows classification of diseases, such as colon cancer and skin cancer, into more defined categories. These improved classifications will eventually allow scientists to tailor drugs for patients whose individual response can be predicted by genetic fingerprinting. For example, cancer patients facing chemotherapy could receive a genetic fingerprint of their tumor that would predict which chemotherapy choices are most likely to be effective, leading to fewer side effects from the treatment and improved prognoses.
- Develop new treatments at the molecular level. Drug design guided by an understanding of how genes work and knowledge of exactly what happens at the molecular level to cause disease will lead to more effective therapies. In many cases, rather than trying to replace a gene, it may be more effective and simpler to replace a defective gene's protein product. Alternatively, it may be possible to administer a small molecule that would interact with the protein to change its behavior.

The Human Genome Project makes its sequencing data available to public and privately funded researchers worldwide at no cost.

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Soda Drinking by Teen Girls Linked With Bone Fractures

Consumption of colas and other carbonated beverages is associated with bone fractures in teenaged girls, according to an article in the June issue of the American Medical Association's Archives of Pediatrics & Adolescent Medicine.

Grace Wyshak, PhD, from Harvard Medical School, Boston, analyzed self-reported survey data from 460 9th- and 10th-grade girls concerning physical activities, beverage consumption, and bone fractures to determine the possible association between carbonated beverage consumption and bone fractures among teenage girls.

Nearly 80 percent of the girls reported drinking carbonated beverages, 49.8 percent cola beverages only, 11.5 percent noncola beverages only and 15 percent both cola and noncola beverages. Approximately 20 percent of girls reported having had a fractured bone. The author found that the girls who drank carbonated beverages had about three times the risk of bone fracture than the girls who did not drink carbonated beverages.

The girls who reported high levels of physical activity and drank cola beverages had nearly five times the risk of fracture as those who did not drink carbonated beverages.

According to background information in the article, teen consumption of soft drinks is on the rise while their consumption of milk has plummeted. While considering past research, Dr. Wyshak speculates that the phosphorus contained in soft drinks may change the physiology of the body including a deleterious effect on bone due to the change in the phosphorus-calcium ratio or possible bone resorption from high levels of phosphorous.

UOP to Use $2 Million Grant to Assist Developmentally Disabled

The California Endowment, the state's largest health foundation, recently awarded the University of the Pacific School of Dentistry a three-year, $2 million grant to expand and strengthen a successful community-based oral health treatment and prevention program for people with developmental disabilities.

"This award represents an exciting opportunity for people with developmental disabilities in California," said Dr. Paul Glassman, project co-chair and director of UOP's Advanced Education in General Dentistry Program. "We know that dental problems are among the greatest unmet needs and this grant represents an opportunity to form community-based coalitions to address this significant problem."

UOP School of Dentistry, working in partnership with state-funded regional centers, has established the following grant objectives:

- Institute dental health care coalitions in eight communities throughout California;
- Implement community-designed and community-based networks for oral health care and prevention;
- Organize prevention training and services for agencies, consumers, and caregivers;
- Train and support local dental professionals in treating patients with developmental disabilities; and
- Establish a statewide task force for persons with special needs.

Web Watch

Pages on herbal remedies

As herbs become increasingly popular as alternative remedies, dentists may want to educate themselves on the purported properties of these plant derivatives. Following are sites devoted to herbs and their effects. Their claims may very well be untested and unscientific, but patients may be reading this kind of information nonetheless.

For scientific information on possible interactions and precautions for herbs as they relate to dentistry, see "Herbal Supplements: Considerations in Dental Practice" by Richard P. Cohan, AB, DDS, MS, MA, MBA, and Peter L. Jacobsen, PhD, DDS, on page XXX of this issue.

http://www.botanical.com

News and information on food and food additives.

http://metalab.unc.edu/herbmed/

FAQs and other information on medicinal and culinary uses of herbs.

http://www.herbsociety.org/

Site of the Herb Society of America, dedicated to promoting the knowledge, use and delight of herbs through educational programs, research, and sharing the experience of its members with the community.

http://www.wic.net/waltzark/herbenc.htm

The site of the Herbal Encyclopedia. Information on various plants and their uses.

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NASA Research Leads to Laser With Dental Use

A laser device inspired by NASA research on atmospheric conditions could provide a one-laser system for use by dentistry on both hard and soft tissues.

Researchers at NASA Langley Research Center, Hampton, Va., have demonstrated that two of the laser wavelengths approved by the FDA for dental applications can be produced from a single, easy-to-use system. This development is expected to result in an increased interest in and use of lasers in dentistry.

Both wavelengths can be produced using the same hardware, reducing cost and complexity. Switching between the two wavelengths is accomplished by selecting the amount and rate of energy sent to the specially designed laser system. The resulting hardware is about one half the size of two distinct laser systems and does not require the laser system to be "tuned" by the operator, as with typical present-day systems, according to NASA.

"The dual system is simple because we've already done all the complex physics in the lab," said Langley laser researcher Keith Murray, one of three inventors of the dental laser technology. The other inventors are Norman Barnes, also of Langley's Laser Systems Branch and Ralph Hutcheson of Scientific Materials Corp., Bozeman, Mont.

A typical hard tissue laser costs about $38,000, and a soft tissue laser costs around $25,000. The dual wavelength unit made possible by this new technology is expected to cost less than $30,000, according to NASA.

The discovery of the two-wavelength technology is a byproduct of work to develop high-power lasers for remote sending of the atmosphere, a key element in NASA's atmospheric sciences mission.

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Second, Do Good

PETER L. JACOBSEN, PHD, DDS

AUTHOR

Peter L. Jacobsen, PhD, DDS, is the director of oral medicine at the University of the Pacific School of Dentistry.

This edition of the *Journal of the California Dental Association* is the second in a two-part series on the dental management of medically complex patients. My introduction for that issue, "First, Do No Harm," outlined the range of articles, including a prototype modern health history translated into several languages. The issue also addressed different types of medical problems a dentist may encounter and resources to find more information. If you did not read that issue, definitely go back, find it in your pile of "things to be read," and at least look at the health history and compare it to the one you are currently using.

This current issue rounds out the information on medically complex patients and should make it clear that, in this medicolegal environment, doing no harm is important but now you must also be proactive, you have to do good. That means ordering appropriate tests, informing the patient about potential drug interactions, ensuring that the health history is updated, etc.

Dr. Day's article is an excellent guide to approaching the treatment of patients with respiratory problems. Asthma is a common condition and knowing how to minimize complications in the dental office is very reassuring. Dr. Cohan and yours truly have provided a perspective on the newest area of medicine, alternative health products. The good news is that even though we always have to be on the alert for potential "drug" interactions, there are no obvious interactions with herbal products and the drugs used in dentistry and certainly no serious ones.

Dr. Budenz has taken a different approach. He selected the most common procedure in dental practice, local anesthesia, and reviewed a wide range of medical problems that can affect that procedure. It is a "must read" for general practitioners and provides a good perspective on the dental management of medically complex patients. Dr. Baker TK here.

This series of articles was made possible by the efforts of the authors and the staff at the CDA Journal. It was done with enthusiasm for you and your patients. If these efforts make it so that one less patient is harmed and even one doctor is spared the agony of "What could I have done differently?" then the effort was worth it.

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Managing the Patient with Severe Respiratory Problems

Mitchell B. Day, DDS

ABSTRACT The dental management of patients with severe respiratory problems continues to be a significant challenge to the dental health care practitioner. Chronic obstructive pulmonary diseases, such as chronic bronchitis and emphysema, are the fourth leading cause of death in the United States. Asthma has increased in prevalence during the past 20 years, and the rate of death from this chronic inflammatory disease of the airways has also risen despite recent advances in medical treatments. This article will review the pathophysiology and medical treatment modalities for these chronic pulmonary diseases, as well as discuss the recognition and management of dental patients with these diseases and provide an understanding on how to avoid precipitating factors that could initiate an acute episode in the dental care setting.

AUTHOR

Mitchell B. Day, DDS,
is TKTK.

The dentist in practice today must be prepared to provide care for patients with complex medical conditions. As people live longer, and with advances in medical care, dentists will be treating more medically compromised individuals in their practices. Consequently, as dental health practitioners, dentists now find themselves increasingly committed to understanding dental patients' overall medical diagnosis and therapy. Because dentists operate at the origin of the upper airway, and many dental procedures are deemed stressful, patients with chronic respiratory diseases are at special risk. Routine dental care can be provided in the dental office when the dentist is knowledgeable about pulmonary diseases and pays specific attention to risk assessment and those precautions that are necessary to prevent acute exacerbations of a respiratory disease state. The entire dental team should be familiar with the signs, symptoms, and management of an emergent episode associated with asthma or chronic obstructive pulmonary diseases.

Asthma

Asthma is a chronic inflammatory disease of the airways characterized by nonspecific hypersensitivity to a variety of stimuli that can precipitate acute episodes of bronchospasm and mucous secretion that result in airway obstruction.[1] It is

estimated that well more than 14 million people in the United States have asthma, with as many as 4.8 million children being affected.[2,3] The prevalence of asthma has increased in the United States since 1960, and the mortality rate has risen significantly throughout the 1980s and 1990s.[4-6] In California from 1983 to 1996, there was a 30 percent increase in the number of hospital admissions for patients with a diagnosis of asthma. Individuals with asthma experience acute episodes of tracheobronchial irritation that present with coughing, wheezing, and dyspnea, the classic clinical triad of the disease. Although asthma was once thought to be isolated acute exacerbations of bronchospasm, medical research has now clearly defined the role of inflammation in its pathophysiology.[7] Contemporary medical management now emphasizes patient education and compliance in the use of long-term control medications that have anti-inflammatory effects on the airways, such as corticosteroids, Nedocromil, Cromolyn sodium, and the leukotriene inhibiting agents. During acute exacerbations or "attacks," fast-acting or "quick-relief" medications, inhaled beta[2] agonists, and anticholinergics are used to reverse the airway obstruction resulting from bronchial smooth muscle contraction, epithelial edema, and mucous secretion.

Classification and Pathophysiology

The etiology of asthma is not clearly defined. Given the varied expression of the disease, it appears to be multifactorial in origin. The traditional classification of asthma describes two basic types: extrinsic and intrinsic.

Extrinsic or allergic asthma is associated with an allergic stimulus that results in the activation of airway epithelial mast cells. The immunoglobin E (IgE)-dependent process is initiated when the individual is exposed to an environmental allergen such as dust, pollen, tobacco, wood smoke, molds, house mites, or animal dander. The mast cells release the inflammatory mediators (i.e., histamine), which promote an immediate bronchospasm often referred to as the "early phase" reaction. With the continued action of these mediators, eosinophils and neutropils migrate into the airways and a "late phase" reaction results in tissue injury leading to airway obstruction through bronchial smooth muscle contraction, epithelial cell shedding, mucous secretion, plasma extravasation, and airway edema.[8,9]

The extrinsic asthmatic patient presents with a known allergic history that has its onset in childhood or early teens. Skin tests to allergies are positive, and blood tests often reveal elevated IgE levels. Extrinsic asthmatic attacks tend to be intermittent and exhibit seasonal variation.

In contrast, intrinsic or nonallergic asthma is different in that no allergic stimulus is identified. Skin testing is negative and elevated IgE levels are not seen in this form. The onset of intrinsic asthma is usually seen in adults, and the acute exacerbations tend to be continuous. Endogenous factors, including emotional stress, or other idiopathic stimuli are thought to initiate the attacks.[10]

It should be noted that very few patients who are diagnosed with asthma exhibit the features of a purely extrinsic or intrinsic form and most will have complex or varied presentation. Furthermore, other forms of asthma have been described, and include drug-induced asthma associated with the intake of aspirin, NSAIDs, angiotension-coverting enzyme inhibitor, and metabisulfite preservatives.11 Exercise-induced asthma is another form that is seen in adolescents and young adults and attributed to vigorous physical activity.

The National Asthma Education and Prevention Program has developed a revised classification for asthma.[2] Individuals with chronic asthma are classified based on the severity of their symptoms, when the symptoms occur, and how often they occur. In addition, the assessment of lung function is vital to the classification. Patients are assigned as mild intermittent, mild persistent, moderate persistent, or severe persistent. This newer classification has resulted in a stepped approach to diagnosis and medical management that addresses the causal inflammatory processes with the goal of preventing or limiting the acute symptoms of the disease.[12]

Diagnosis and Medical Treatment

At initial presentation, patients with asthma give a history of recurrent coughing, wheezing, difficulty breathing, and chest tightness. Based on the severity and frequency of these symptoms, pulmonary function testing further delineates the degree of airway obstruction. Spirometry is used to quantify the degree of disease with forced expiratory volume in one second (FEV1). In addition, peak expiratory flow (PEF) can be followed daily by patient-administered spirometry in a moderate to severe diagnosis as a method of monitoring the disease and evaluating the response to medication therapies.

Individuals with mild intermittent asthma (experience symptoms twice a week or less) exhibit relatively normal PEF values between attacks and have nocturnal symptoms less than two times per month. These patients rarely require daily medications for long-term control. Behavior modification to avoid factors that stimulate acute exacerbations and use of fast-acting beta-adrenergic bronchodilators define the first step approach in these patients.

If symptoms occur more than two times per week, nocturnal episodes occur more than twice a month, and pulmonary function values show a decreased ratio of FEV1 to forced vital capacity (FVC) with variability in PEF of 20 percent to 30 percent, then these patients are classified as having mild persistent asthma. Initial therapy and additional stepwise therapies may be

more complex for these individuals. Long-acting anti-inflammatory drugs are used daily and may include low-dose inhaled corticosteroids, the mast cell stabilizers Cromolyn sodium or Nedocromil, and the newer leukotriene antagonist drugs such as Zafirlukast and Zileuton.[12-14]

Patients with a diagnosis of moderate persistent asthma exhibit symptoms daily, use fast-acting beta-adrenergic bronchodilators daily, and experience nocturnal symptoms more than once a week. These patients have FEV1 to FVC ratios that are less than 80 percent and the variability in PEF can be greater than 30 percent. Treatment with multiple therapeutic agents may be required to establish long-term control of their symptoms. In addition, medium to high dose inhaled corticosteroids are often indicated. Many of these patients may be placed on the long-acting beta selective agonist bronchodilator, Salmeterol, for prolonged maintenance.[15,16] In addition, albuterol's beta agonist properties can be used as a long-acting agent when given orally as an extended release tablet and is useful in long-term control of nocturnal symptoms. The diagnosis of moderate persistent asthma requires that the patient must also take an active role in the treatment and monitoring of their disease state. Long-term control of this disease can be greatly enhanced by educating the patient on the complex medication regimens, the value of self-monitoring with spirometry, and the proper technique in using inhalers and nebulizers, as well as avoiding exposure to potential stimulating factors.[2,17]

The patient with severe persistent asthma can experience daily symptoms and acute exacerbations, which can, in turn, limit their physical activities. Nocturnal symptoms are common. Lung function is highly variable with the FEV1 to FVC ratio at 60 percent or lower and variability in PEF at more than 30 percent. The multiple medication regimens used to treat moderate persistent asthma may prove to be inadequate. A step-up in therapy is now indicated for severe persistent asthma with higher dose inhaled corticosteroids and long-acting beta agonists serving as the preferred pharmacotherapy. When severe asthma exacerbations continue, systemic corticosteroids are used as a short-term therapy to help alleviate the severity of the exacerbations despite the potential significant systemic side effects of oral administration.[12,18] In addition, sustained-release theophylline is considered in the management of the severe persistent asthmatic not responding to the other drug modalities. Once a mainstay in asthma therapy, theophylline is now a secondary or tertiary agent mainly used to treat the nocturnal symptoms because of concerns for the drug's narrow therapeutic range requiring frequent serum level monitoring, potential drug interactions and adverse effects on multiple organ systems.[19,20]

Given the varied expression of asthma, long-term successful management of the disease is achieved through very individualized stepwise drug therapy and an emphasis on patient education and compliance. All patients with asthma can experience mild, moderate, or severe exacerbations, which can evolve to a life-threatening episode. The stepwise approach to diagnosis and therapy has greatly decreased the severity and frequency of asthma symptoms in many patients. While quick-relief, fast-acting inhaled bronchodilator drugs treat the severe symptoms of bronchial airway obstruction in the acute asthmatic attack, long-term control medications offer the greatest potential to alleviate asthma symptoms, improve pulmonary function, and diminish the diseases overall morbidity. **Table 1** provides both a classification and treatment protocol for the medical management of asthma. This format can assist the dentist in the development of a patient's risk assessment prior to initiating dental treatment.

Risk Assessment

The primary objective for the dentist in the management of a patient with a medical condition is to prevent any complications related to that condition as a result of dental treatment. The asthmatic patient can be treated for their dental needs when the dental health practitioner has developed a risk assessment that is individualized for that patient. This assessment begins with an appropriate understanding of the patient's medical history. The health history questionnaire and a comprehensive interview by the dentist is the foundation of the risk assessment process.

For the asthmatic patient, the dentist should determine the following aspects of that patient's disease history:

- Classification or type of asthma;
- Current medication regimens;
- Patient's understanding and compliance with medical treatment;
- Factors that precipitate acute exacerbations;
- Frequency and timing of episodes;
- How often the fast-acting or quick-relief bronchodilators are used; and
- History of emergency room visits or hospitalizations.

This information is then used to determine the stability and severity of the disease, provide an indication for a medical consultation prior to dental treatment, and guide the practitioner in the development of an appropriate management protocol. The patient's understanding of his or her disease and compliance with the prescribed medical therapies is of vital importance.[21] The asthmatic patients who are most likely to experience frequent acute exacerbations and present a higher risk of having a complication associated with dental treatment are those who are not compliant with their complex drug regimens and have a poor perception of the diagnosis of asthma. These patients and patients with a diagnosis of severe asthma should have a medical consultation prior to any extensive or stressful dental treatments.

Dental Management

Given the complex expression of asthma, management protocols for asthmatic patients should be tailored to their individual needs based on the dentist's risk assessment. With stress being a primary precipitating factor for the stimulation of an acute asthmatic attack, a stress-free environment is essential in treating all asthmatic dental patients. The anxious patient may require sedation for dental procedures. The use of nitrous oxide-oxygen inhalation sedation should be considered and can be combined with short-acting oral benzodiazepines. Nitrous oxide is not irritating to the airway, does not cause a depression of respiration, and may have an analgesic effect to supplement the use of local anesthesia for pain control. The time of day and the length of dental treatment visits should be adjusted to prevent a stress-inducing situation. For those patients with moderate to severe persistent asthma, it is appropriate to have them prophylactically administer their own fast-acting bronchodilator medication preoperatively to their treatment appointment and ensure they used their inhaled corticosteroid medications as scheduled.

The preoperative management of the asthmatic patient centers on avoiding factors that can stimulate an exacerbation of acute symptoms leading to bronchospasm. In dental treatment, the potential of drug interactions is of primary consideration. Aspirin and nonsteroidal anti-inflammatory drugs should be avoided in the management for postoperative pain, as they are known to stimulate asthmatic attacks. Relative contradictions for both narcotics and barbiturates have been identified for asthmatic patients. Drugs from both groups can increase the risk of bronchospasm and should not be used. Furthermore, the use of certain antibiotics to treat orofacial infection is contraindicated in moderate to severe asthmatics who are taking theophylline. Ciprofloxacin and the macrolides (i.e., erythromycin, clarithromycin and azithromycin) alter the metabolism of Theophylline, which can result in toxic serum levels of this drug.

The selection of a local anesthetic is important when treating asthmatics. Many local anesthetic solutions contain sulfites as a preservative. Sulfites are known to precipitate acute asthmatic attacks and allergic reactions.22,23 These compounds are found in local anesthetic preparations containing epinephrine and levonordefin, and these preparations should not be used in patients known to be sensitive to sulfites.

Management of an Acute Asthmatic Episode

The onset of symptoms associated with an acute asthmatic attack can vary considerably in asthmatic patients. With stress being a major factor in stimulating

Table 1.

Step-Wise Classification and Management of Asthma

1) Mild Intermittent Asthma

Fast-acting Bronchodilators–for quick-relief acute episodes

A. Non-selective beta agonist

Epinephrine	(Primatene Mist)
Ephedrine	(Eted II)

B. Selective Beta-2 Agonist

Albuterol	(Ventolin, Proventil)
Terbutaline	(Brethaire)
Tirbuterol	(Maxair)
Bitolterol	(Tornalate)

2) Mild Persistent Asthma

Fast-acting Bronchodilators–for quick-relief acute episodes

Long-term Control Medication–Anti-inflammatory

Usually one medication daily

A. Low-dose Inhaled Corticosteroids

Triamcinolone	(Azmacort)
Fluticasone	(Flonase)
Flunisolide	(Aerobid)
Budesonide	(Plumicort)
Beclomethasone	(Beclovent)

B. Inhaled Nonsteroidal Anti-inflammatory

Cromolyn Sodium	(Intal)
Nedocromil	(Tilade)

C. Leukotriene- Inhibiting Drugs

Zafirlukast	(Accolate)
Zileuton	(Zyflo)

3) Moderate Persistent Asthma

Fast-acting Bronchodilator–for quick-relief acute episodes

Long-term Control Medication–Anti-inflammatory

One to two medications daily

A. Meduim-dose Inhaled Corticosteroids

B. Inhaled Nonsteroidal Anti-inflammatory

C. Leukotriene- Inhibiting Drugs

D. Long-acting Bronchodilators

Isoproterenol	(Isuprel)
Metaproterenol	(Alupent)
Salmeterol	(Serevent)
Albuterol	(Oral Tablets)

4) Severe Persistent Asthma

Fast-acting Bronchodilator–for quick relief acute episodes

Long-term Control Medications–Anti-inflammatory

Multiple Medications Daily

A. High Dose Inhaled Corticosteriods

B. Long-acting Bronchodilator

C. Methylxanthines

Sustained-release Theophylline

D. Oral Corticosteriods

Prednisone	(Deltasone)
Prenisolone	(Delta-Cortef)
Methylprednisolone	(Soll-Medrol)

asthmatic bronchospasm, the practitioner should be alert to increasing anxiety or apprehension in patients. Most asthmatic episodes are accompanied with the onset of a cough, the patient complaining of a feeling of chest tightness, dyspnea, and wheezing. Once an acute episode is diagnosed, the following maneuvers are indicated to reverse the underlying bronchospasm:

- Discontinue dental treatment;
- Place patient in an upright sitting position;
- Assist patient in administration of their fast-acting bronchodilator or administer albuterol (Ventolin/ Proventil) from an emergency kit metered-dose inhaler;
- Administer oxygen using a nasal cannula, nasal hood or full-face mask at 2-3 L/ minute; and
- Reassure and act calmly.
- If the episode resolves, consider the need for a medical consultation and re-evaluate the office stress-reduction protocol, the length and time of the dental appointments, and the need for sedation with further appointments.
- If the attack continues after initial maneuvers, a serious medical emergency is indicated:
- Call 911 or contact the community emergency medical response number;
- Administer epinephrine by injection sublingual, intramuscular or subcutaneous. A 1:1000 concentration is used, give 0.3 to 0.5 ml; repeat doses can be given at 20 minute intervals.
- Assist airway, breathing and circulation as needed;
- Continue oxygen; and
- Monitor vital signs.

The patient will require transfer to a medical facility by trained emergency medical personnel for treatment with intravenous corticosteroids, airway management and evaluation of their medical treatment for their asthma.

Chronic Obstructive Pulmonary Disease

The American Thoracic Society has defined chronic obstructive pulmonary disease as a disease state characterized by the presence of airflow obstruction due to chronic bronchitis or emphysema; the airflow obstruction is generally progressive, may be accompanied by airway hyperactivity, and may be partially reversible.[24] It is estimated that 12 to 14 million people in the United States suffer from chronic obstructive pulmonary disease and the disease is currently the fourth leading cause of death.[25] While deaths due to cardiovascular disease are on the decline, death from chronic obstructive pulmonary disease has increased by more than 40 percent since the early 1980s.[26,27]

Two very different conditions are included in the definition of chronic obstructive pulmonary disease: chronic bronchitis and emphysema. These two conditions have their own distinctive set of symptoms and underlying pathophysiology. Chronic bronchitis is described in clinical terms as the presence of a cough with the production of sputum for at least three months for a minimum of two years in succession. Emphysema is defined in pathological terms as the abnormal, nonreversible enlargement of the air spaces distal to the terminal bronchioles associated with alveolar wall destruction. It should be noted, however, that very few patients with chronic obstructive pulmonary disease exhibit symptoms exclusive of chronic bronchitis or emphysema. In fact, many patients share symptoms attributed to both conditions.[24]

Etiology

Both conditions share a common etiology with exposure to tobacco smoke being the primary cause of chronic obstructive pulmonary disease. However, for reasons that are unclear, only about 15 percent of cigarette smokers actually develop clinically significant chronic obstructive pulmonary disease, while tobacco smoking is known to account for 80 percent of the risk of acquiring the disease.[28,29] The incidence of chronic bronchitis in cigarette smokers increases with age and the amount of cigarettes consumed, indicating that the risk is dose- and duration-dependent. Passive smoking or "second-hand smoking" may also contribute to the development of the disease. Children of smokers are known to have a higher incidence of respiratory symptoms, and respiratory function is decreased when measured through pulmonary function testing.[24]

Other identifiable risk factors include environmental pollutants such as ambient air pollution, indoor irritant sources, and occupational airborne hazards. Based on epidemiological evidence a nonspecific hyperresponsive airway condition has been identified as another possible risk factor leading to chronic obstructive airflow disease, but the specific causes of this condition have not been well-defined.[30]

A genetic disorder of a 1 – antitrypsin deficiency is known to cause chronic obstructive pulmonary disease and accounts for less than 1 percent of those individuals diagnosed with chronic obstructive pulmonary disease. a 1 – antitrypsin is produced in the liver and acts in the lungs to inhibit the action of neutrophil elastase, which leads to the enzymatic breakdown of the lungs elastin connective tissue.[31] Multiple autosomal codominant alleles at a single locus contribute to the inheritance of a 1 – antitrypsin, which in turn results in a varied expression of this genetic abnormality. When a severe deficiency of a 1 – antitrypsin is present, nonsmokers can develop bronchiectasis, chronic bronchitis and basilar emphysema. The onset of airflow obstruction can develop before the age 50 and individuals with this condition are at extreme risk of acquiring clinically significant chronic obstructive pulmonary disease.[32]

Pathophysiology

The anatomical and physiological changes that result in the clinically significant chronic airflow obstruction

condition occur over a long period of time with exposure to the predisposing causative agent. Expiratory flow values are used to diagnosis and establish the severity of the disease. Cigarette smokers with obstructive disease will show a progressive decline in the FEV1 at a rate two to three times faster than nonsmokers. With smoking cessation in individuals with mild to moderate airflow obstruction, the rate of deterioration can return to that seen in nonsmokers and their symptoms may decrease.[33]

In patients with chronic bronchitis, the airflow obstruction is the result of sustained inflammation that proceeds with mucus cell metaplasia and increased mucus production, loss of ciliated respiratory epithelium, mucosal edema, and fibrosis of the associated bronchiolar and alveolar walls. Early on in the disease process, there is a marked increase in the airflow resistance in the peripheral airways. Over time with progressive deterioration, the obstruction extends to the bronchiolar walls. Acute exacerbations of this condition have been associated with respiratory tract infections. Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis have been isolated in the lower bronchi of patients with chronic bronchitis. The exact role of infection in the long-term progression of the disease process is poorly understood.[34]

Emphysema develops when there is an irreversible enlargement of the bronchioles and the alveoli. Distal to the terminal bronchiole, there is a concomitant breakdown in the alveolar ducts and the alveolar sacs, which will extend to the collapse of the terminal bronchiole. This leads to an airflow obstruction that hinders expiration. The breakdown of the distal air spaces occurs as a result of a protease-antiprotease imbalance, which leads to a degradation in the elastin in the alveolar walls. It is proposed that cigarette smoke can activate macrophages in the lungs to release factors that directly stimulate neutrophils to secrete elastases and combine with oxidants and free radicals, which in turn oxidize a 1 – antitrypsin.[35] The combined effect on the lung parenchyma is a destructive process that is characterized by the degradation of elastin and an inhibition of new elastin synthesis. Several different types of emphysema have been described based on the anatomical areas within the lung that are affected. Centriacinar (centrilobular) emphysema is most often seen in the chronic cigarette smoker and is associated with the respiratory bronchioles, first with airway enlargement and destruction and then advancing distally. Panacinar (panlobular) emphysema is a uniform enlargement and breakdown of the air spaces throughout the acinus and is observed in patients with severe a 1 – antitrypsin deficiency.

The airflow obstruction in both chronic bronchitis and emphysema develops over a long period with exposure to cigarette smoke. The anatomical changes are irreversible once a moderate amount of disease progression is established.

Diagnosis and Medical Treatment

Individuals with chronic obstructive pulmonary disease usually present after the fifth decade of life with increasing complaints of chronic cough with sputum production or acute chest illness, which includes dyspnea, or shortness of breath on exercise. The individual with advanced chronic bronchitis is often described as a "blue bloater," presenting with a chronic productive cough. The patient's lung sounds are wet, characterized by rales and rhonchi. The patient reports a history of frequent chest infections. Findings of wheezing and dyspnea in this patient could be erroneously diagnosed as asthma. A chest radiograph appears normal. Arterial blood gas studies reveal a marked reduction in PaO_2 (hypoxia) and increase $PaCO_2$ (cyanosis). The patient also shows signs of peripheral edema associated with right heart failure, (cor pulmonale) and may have marked pulmonary hypertension.

The patient with emphysema is described as a "pink puffer," presenting with dyspnea and minimal or no cough. Typically, the patient is thin with a "barrel chest" appearance and quiet chest sounds on auscultation. Hyperinflated lung fields and an increase in the anterior to posterior dimensions of the patient's chest are noted. The chest radiograph shows hyperinflation, a "small" heart and a flattened diaphragm. Arterial blood gas studies reveal normal to slightly reduced PaO2 and PaCO2.

Both chronic bronchitis and emphysema show marked decrease in the FEV_1 / FVC ratio. When lung volumes are measured, there is an increase in the residual volume (RV), and a normal or increased functional residual capacity (FRC) is observed. Pulmonary function tests are essential in determining the severity of the disease state, with FEV1 serving to quantify the degree of airflow impairment. When correlated with factors such as age and the assessment of the levels of hypoxia and hypercapnia through arterial blood gas analysis, this information is used to individualize the diagnosis, prognosis, and treatment regimen appropriate for the patient with chronic obstructive pulmonary disease.

Because chronic obstructive pulmonary disease cannot be cured, medical treatment is directed at reducing the degenerative effects of the disease and managing the acute and chronic symptoms of chronic bronchitis or emphysema. Smoking cessation is the single most important therapy for patients with obstructive airway disease and proves to be the greatest challenge for the patient and the physician in managing the disease.[36] The reasons that people smoke cigarettes are multifactorial and include issues of nicotine addiction, education, income, conditioned psychological responses, and mental health. Clinician intervention, community support, and pharmacological treatments combined offer the best hope in achieving

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Table 2.
Step-Wise Medical Management for Chronic Obstructive Pulmonary Disease

1) Mild to Moderate Disease

A. Smoking Cessation–physician intervention
Behavior Modification Program
Nicotine Replacement Therapy
Trans-dermal patch and oral medications
Support Groups
B. Eliminate Environmental Exposure/Causes
Air Pollution
Industrial or Workplace
Household Sources
C. Physical Conditioning (Improving Functional Capacity)
Exercise training to improve respiratory function and exercise tolerance.
Nutrition and Hydration
D. Immunizations: influenza and pneumococcal
E. Antibiotic Therapy for acute infections/exacerbations of chronic bronchitis attributed to known pulmonary pathogens.
F. Treat symptoms of Bronchospasm
Anticholinergic Aerosol Agents- Ipratropium Bromide (Atrovent)
Sympathomimetic Agents- $Beta_2$ agonist- meter-dosed inhalers

II) Moderate Disease

A. Through F.
When symptoms continue and improved pulmonary function is suboptimal
G. Sustained-release Theophylline
H. Systemic or Inhaled Corticosteroids
High-dose Prednisone short course
Lowest dose Prednisone in long-term management
Prolonged systemic steroid therapy is avoided

III) Severe Disease

A. Through H.
With evidence of progressive hypoxia and hypercarbia
I. Supplemental oxygen therapy, minimum 18 hours daily with PaO_2 ≤55mm Hg or SaO_2 ≤89%
J. Note therapy for congestive heart failure, cor pulmonale and polycythemia

smoking abstinence in patients, and even still long-term success rates are often less than one-third of the patients that enroll in multi-faceted programs.[37] Exposure to other potential inhaled irritants such as air pollution, home and personal care aerosolized products, and industrial or workplace irritants can cause acute exacerbations in patients and should be avoided.

Treatment of chronic bronchitis is directed at reversing or preventing airflow obstructions caused by inflammation, infection, and mucus secretion. Immunization with pneumococcal and influenza vaccines is an important component in the long-term management of the disease. The use of antibiotics is reserved for acute exacerbations and directed at known pathogens that can cause a superimposed acute bacterial tracheobronchitis. As with the treatment of asthma, the pharmacological treatment of chronic bronchitis and emphysema is managed in an individualized stepwise manner correlated to the severity of the disease. To ensure the patient's participation in successful long-term management of the disease, it is essential to educate the patient about the diagnosis, disease severity, and indications for the medications used in treating the disease.

Bronchodilators are used in the treatment of both chronic bronchitis and emphysema. The beta2 agonists can contribute to the relief of symptoms but do not contribute the same type of sustained bronchodilation with improved pulmonary function that can be seen in asthmatics.

In older chronic obstructive pulmonary disease patients, these drugs may also have sympathomimetic side effects that complicate concomitant cardiovascular diseases. Anticholinergic inhaled agents offer a slower onset, longer action, and fewer side effects. The atropine derivative, ipratropium bromide is available as a metered-dose aerosol and has shown to be effective in relieving symptoms resulting from chronic airway obstruction.

When the symptoms associated with chronic obstructive pulmonary disease are continuous or more severe and their management with the bronchodilators is suboptimal, the use of sustained-release theophylline is considered. Theophylline has been shown to improve respiratory muscle function, stimulate the respiratory center and improve mucociliary clearance.[38] Patients with co-existing cardiac disease, cor pulmonale, and pulmonary hypertension may benefit from the improved cardiac output, reduced pulmonary vascular resistance, and improved myocardium perfusion that theophylline can produce.[39]

The use of corticosteroids has limited applications in the treatment of chronic obstructive pulmonary disease given that the disease process is primarily one of tissue degeneration and destruction with little or no reversible component. For patients with chronic bronchitis, the inhaled corticosteroids may have an application in treating airway inflammation.40 Because of the potential long-term effects of high-dose oral corticosteroids, their use is limited to

selected patients that show improvement or treatment of acute exacerbations that respond to short course therapy.

Patients with co-existing heart disease such as cor pulmonale and right heart failure will often be placed on diuretics or arterial vasodilators to treat pulmonary hypertension that develops with severe chronic obstructive disease. Their overall medical management is complex, and these patients will require constant observation by the treating physician. As the effects of the disease become more severe, monitoring and treating progressive hypoxemia and pulmonary hypertension will require long-term supplemental oxygen administration. The use of oxygen therapy has been shown to enhance survival rates and greatly improve the quality of life for individuals with severe chronic obstructive pulmonary disease. The supplemental administration of oxygen for a minimum of 18 hours/day at a rate of 2L/minute via nasal cannula maintains oxygen saturation levels of greater than 90 percent. When patients present with a PaO_2 of less than or equal to 55 mm Hg or a SaO_2 of less than 88 percent, this is considered an absolute indication for oxygen therapy.[41] Long-term oxygen administration can improve cardiac function, reverse polycythemia and reduce the symptoms associated with cor pulmonale.

Pulmonary rehabilitation is a multifaceted effort directed at educating the patient, improving physical conditioning and nutrition, and supporting the psychological needs of patients with chronic obstructive pulmonary disease. **Table 2** summarizes the stepwise treatment protocol for the medical management of chronic obstructive pulmonary disease patients.

Risk Assessment

Patients with moderate to severe chronic obstructive pulmonary disease seeking dental care require a risk assessment that identifies the type of disease, establishes the severity of the condition, and documents the success or compliance of the patient's medical treatment. In addition, other medical conditions, which may affect the chronic airway obstructive disease, should be identified and evaluated. While the majority of patients with significant symptoms of productive cough or shortness of breath will have sought medical evaluation and treatment, the dental health practitioner must be alert to patients with untreated or undiagnosed symptoms of chronic bronchitis or emphysema. The health history questionnaire and the dentist-patient dialogue can alert the practitioner to possible concerns for respiratory disease. The physical exam, through observation and auscultation of the patient, can reveal signs of chronic obstructive pulmonary disease. When a concern for a patients respiratory status is noted and an understanding of their functional airway reserve is desired, a simple "breath holding" test can be performed. For example, with the patient sitting upright, have him or her take as deep an inspiratory breath as possible while holding the nostrils closed. Ask him or her to hold his breath as long as possible. Note the length of time before he or she must exhale and desire another breath. People that can only hold their breath for 10 to 20 seconds may have a moderate degree of pulmonary compromise, while those that cannot go longer than 10 seconds may have severe obstructive airway disease. Patients with moderate to severe airflow obstruction should have a medical consultation prior to any extensive or stressful dental treatment.

Dental Management

The reduction of stress and avoidance of any procedures that may depress a patient's respiratory function are essential in the management with moderate to severe chronic obstructive pulmonary disease. Patients should be offered a professional and reassuring environment with short, focused dental treatments early in the day. If appropriate, sedation can be considered, but potent sedatives, barbiturates or narcotics should be avoided as they can depress the respiratory drive. Nitrous oxide and high flow rates of oxygen are contraindicated because their use can result in respiratory depression in patients with severe disease exhibiting CO_2 retention. Placing a patient in a reclined position or the use of a rubber dam can contribute to a sense of respiratory compromise. Low-flow supplemental oxygen administration via nasal cannula at rates of 2 to 4 L/minute is appropriate even in patients with severe disease.

The use of certain drugs in the dental-related treatment of chronic obstructive pulmonary disease patients should be avoided. Anticholinergic or antihistamines can alter tracheobronchial secretion, which may promote an acute respiratory infection or stimulate inflammation or irritation to the airways leading to further airflow disturbance. When antibiotic therapy is indicated for an odontogenic infection or prophylaxis, patients taking theophylline should not be given macrolides, ciprofloxin, or clindamycin, which can lead to methylxanthine toxicity.

Management of Respiratory Distress

A primary concern for patients with moderate to severe chronic obstructive airway disease is avoiding situations in dental treatment that will promote an acute episode of respiratory distress. When concomitant cardiovascular disease is also present, these patients will also have a risk of myocardial infarct, heart failure, morbid arrhythmias, and acute pulmonary edema precipitated by respiratory depression. The early recognition and treatment by the dental team of a chronic obstructive pulmonary disease patient developing respiratory failure is paramount. Shortness of breath, wet airway sounds, expiratory wheezing, elevated blood pressure and heart rate, and increasing apprehension or agitation may all accompany a patient in respiratory distress. Once an acute episode is

diagnosed and treatment has stopped, the following maneuvers are indicated:

- Place patient in an upright sitting position;
- Administer oxygen at a low-flow rate of 2-4 L/minute via nasal cannula or hood;
- Assess and assist airway, breathing and circulation;
- Monitor vital signs; and
- Summon emergency medical assistance.

The severity of the disease and the patient's medical management must be reassessed and warrants the transfer of the patient to a medical facility for further evaluation.

Conclusion

Dental care for patients with respiratory diseases continues to be an important aspect of the practice of contemporary dentistry. Routine dental care can be provided for patients with severe respiratory problems when the dentist is knowledgeable about pulmonary diseases and is familiar with the signs, symptoms, and management of an emergent episode associated with asthma or chronic obstructive pulmonary disease. Patients with severe respiratory problems can receive safe and appropriate care when the dental team has conducted a proper risk assessment and tailored the necessary dental treatment to each individual patient's needs and tolerance. Preparation is vital to the prevention of a medical emergency arising from dental treatment in patients that are compromised by serious health conditions.

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Herbal Supplements: Considerations in Dental Practice

Richard P. Cohan, AB, DDS, MS, MA, MBA, and Peter L. Jacobsen, PhD, DDS

ABSTRACT Over-the-counter natural herb products constitute a rapidly growing market in the United States. As with conventional medications, the health care provider needs to be aware of these products' effects, side effects, advantageous synergies, and possible or probable adverse drug reactions. This paper will present 20 of the most frequently used herbs in the United States and discuss appropriate precautions and herb-drug interactions of possible concern in clinical dental practice.

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Plants (herbs) and naturally derived products from plants (herbal supplements) have been used to enhance health and for medicinal purposes for thousands of years.a Currently, over-the-counter natural herb products constitute a rapidly growing market in the United States with sales exceeding $2.6 billion in 1999.[1] This is part of a growing consumer trend to embrace alternative or complementary health care modalities.[2,3] Most of these herbal supplements have been utilized for centuries based on empirical and testimonial support for their efficacy. Increasingly, the scientific evidence-based literature is supporting the efficacy and safety of numerous herbs, including St. John's wort for depression, ginkgo biloba to prevent memory loss and saw palmetto for benign prostatic hyperplasia. In some countries, such as Germany, concentrated herbal extracts are produced under strict "good manufacturing practices" and are available only by prescription,b whereas in the United State, sourcing, manufacturing practices, purity and potency vary widely, and herbals are primarily sold over the counter and through various types of health practitioners. In recent independent tests, only a minority of herbal and nutracentrical products tested were found to be satisfactory.[c]

As with conventional medications, if a patient is using herbal supplements

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alone or in combination with conventional prescription medications, the health care provider needs to be aware of their effects, side effects, advantageous synergies, and possible or probable adverse drug reactions.[d]

This paper will present 20 of the most frequently used herbs in the United States, according to sales data published in magazines such as "Whole Foods" and in the newsletter "Nutrition Business Journal."e It will focus primarily on appropriate precautions and herb-drug interactions of possible concern in clinical dental practice. It must be emphasized that the adverse drug reactions noted in this paper are largely based on inferences drawn from the documented actions of the herbs. However some adverse drug reaction information is based on in vitro analyses, some on in vivo animal studies and some on in vivo human studies.

The most popular herbal supplements in the United States are promoted and utilized to minimize fatigue and/or depression, boost the immune system, improve circulation and memory, modify blood pressure, control cholesterol levels, and decrease pain. Some are reported to produce myriad effects and are recommended as "adaptogens" to support optimum health. All of these vague nonspecific health claims are based on allowable claims under the Dietary Supplement and Health Education Act of 1994 (**Table I**).

On Feb. 5, 2000, the claims allowable under the act were broadened to include the prevention, cure, or treatment of some specific "diseases." This change expands the originally allowed safety assertions and "structure/function" claims, such as "improves mental clarity," "enhances immune function," etc. Supplement manufacturer labels can now claim that their products can be used to treat various life-stage conditions such as hot flashes, acne, wrinkles associated with aging, or pregnancy-related morning sickness.

Ironically, as reported in the San Francisco Chronicle on Feb. 14, 2000, this recent expansion of claims comes just 16 months after the Food and Drug Administration announced that it had stopped tracking adverse drug reactions related to nutritional supplements. It had logged 2,621 such adverse events, including 184 deaths possibly associated with herbal supplementation (emphasis added). Of course, these numbers pale in comparison to the more than 100,000 Americans who die each year from "properly prescribed" prescription drugs, and thousands more who experience adverse drug reactions due to medication errors, as reported by various sources who reviewed a University of Toronto study published in 1998. A further warning appeared March 12, 2000, in the San Francisco Chronicle regarding

TABLE 1.

Important Components of the Dietary Supplement and Health Education Act of 1994

A. Definition of dietary supplement (Section 3)

1. A product (other than tobacco) that contains one or more of vitamins, minerals, herbs, amino acids, etc.;
2. Is presented as capsules, tablets, liquids, powders, soft gels, etc.;
3. Is not a conventional food or sole item of a meal or diet;
4. Is labeled as a dietary supplement.

B. Safety of dietary supplements

1. Burden of proof is on the FDA

C. Supplement claims and labeling

1. Manufacturer must have evidence/research supporting claims, but they are not required to show it to anyone.
2. FDA has burden of proof that it does not work.

D. Statement of nutritional support (or label)

1. O.K. if a classical nutrient-deficiency benefit is claimed
2. O.K. if role of supplement is to affect structure or function of body
3. Characterizes documented mechanism of action
4. Describes general well-being from consuming the ingredients
5. Prominently displays a BOLD disclaimer that the statements have not been evaluated by the FDA.

E. Supplement Ingredient Labeling and Nutrition Information

1. Must include the following information (or will be removed and considered misbranded):
   a. Name of each ingredient;
   b. Quantity of each ingredient;
   c. Total weight of those ingredients;
   d. Identity of the part(s) of plant from which ingredients are derived; and
   e. The term "dietary supplement."

Note: Adapted from Israelson L, Summary of the Dietary Supplement Health and Education Act of 1994. In Quarterly Review of Natural Medicine. Natural Product Research Consultants Inc, Seattle, Wash, Spring 1995.

Asian remedies in particular, which may have a higher incidence of impurities or become dangerous when ingested in the form of pills or powders in contrast to their safe use as teas for many centuries. A further concern is that raw or partially processed materials are misidentified with occasional deadly outcomes.

Table 3 lists 20 popular herbal supplements. The table describes some uses of these herbs, their potential for interfering with dental treatment, and known potential interactions with prescription drugs utilized in the dental setting. For example, just recently St. John's wort was reported to interact with the immunosuppressant drug cyclosporine and the antiretroviral drug indinavir.[4] Also, some patients may experience increased photosensitivity when St. John's wort and tetracycline are combined. Patients taking Kava-Kava and alprazolam (a benzodiazapine) may experience a very dangerous synergistic effect, e.g., coma.[5] If known to the authors, the American Herbal Products Association classification (**Table 2**) is noted in a separate column of **Table 3**.

The dentist should recognize that it is often difficult to distinguish the true cause of drug interactions because of the confluence of a variety of factors. These factors include those that are patient-related, such as genetics or comorbid conditions (e.g., sinus infection coexisting with chronic apical periodontitis), and those that are drug-related, including dosage regimens and pharmacokinetic considerations. The latter includes the fact that co-consumption of herbs and over-the-counter or prescription medications (agents) may influence the absorption, distribution, metabolism, or renal elimination of any of these agents. Further, pharmacodynamics (synergistic or antagonistic effects) may be a factor with certain combinations of herbs and mediations.

An excellent series of five articles was recently published in the Journal of the American Dental Association.6 The articles review adverse drug reactions in dental practice. Those authors have adapted a table from Tatro6 that they titled "Significance Ratings for Dental Drug Interactions" based on the quality of the information used to document the purported drug interactions and an assessment of the severity of these drug interactions, particularly those associated with the use of antibiotics, analgesics, sedatives, local anesthetics, and vasoconstrictors in dental practice. From these ratings, they propose a cumulative rating scale (**Table 4**). None of the herbal supplements included in **Table 3** have been subjected to this sort of detailed scrutiny to date. The information in **Table 3** is assembled from what the authors believe to be reliable sources.[8-21]

The most common dental precautions are related to side effects of the herbal supplements alone. For example, certain herbals may cause direct effects on oral tissues, including tongue numbness with echinacea, burning of the tongue with garlic, and mouth/throat irritation with high doses of goldenseal. Indirect oral effects include halitosis secondary to garlic, excess saliva associated with goldenseal, and blood pressure increase and irritability secondary to Siberian ginseng.

Some herbal supplement side effects may be confused with side effects of prescription medications used in dentistry. For example, several of these supplements can cause stomach upset. Such gastrointestinal upset can be confused with stomach upset caused by erythromycin prescribed by the dentist. Depending on the situation, the dentist may request the patient discontinue their herbal supplement(s) so as not to cause confusing complications with necessary antibiotic therapy. Some patients may combat this problem by consuming probiotics in pills or powders or via cultured milk or milk-like (soy, rice, etc.) products.

Bleeding is a side effect of herbal supplement use that manifests either via direct effects on capillaries, by interfering with platelet adhesion, or by increasing fibrinolytic activity. Caution is advised regarding the prescribing of aspirin or other nonsteroidal anti-inflammatory drugs to dental patients on anticoagulant medication. But this caution is magnified particularly in patients who also are taking herbs associated with increased bleeding, such as bilberry, cayenne, feverfew, garlic, ginger, ginkgo and

TABLE 2.

American Herbal Products Association Safety Ratings

Class 1 – Herbs that are safe with appropriate use.

Class 2 – Herbs that have restrictions:

2a – For external use only unless otherwise directed by a professional with expertise using the particular substance;

2b – Not for use during pregnancy unless otherwise directed by a professional with expertise about using the particular substance during pregnancy;

2c – Not for use while breast-feeding unless otherwise directed by a professional with expertise about using the particular substance while nursing; and

2d – Other restrictions according to professional guidance.

Class 3 – Herbs that can be used only with the guidance of a qualified professional (equivalent to requiring a prescription from a physician).

Class 4 – Herbs with insufficient data for classification.

Ratings adapted from McGuffin M, Hobbs C, et al, Botanical Safety Handbook, 1997.

Table 3

Twenty Popular Herbal Medicines (Listed Alphabetically). Uses, Dental Precautions and Drug Interactions

Herbal Supplement	AHPA Rating	Use	Precautions in Dentistry	Dentally significant drug interactions
Aloe		Soothe wounds and burns, accelerates wound healin,	When swallowed, cathartic hastens passage of all oral medications, thus inhibiting (reducing) their action	May potentiate anticoagulant therapy by reducing absorption of vitamin K from the gut
Astragalus (Tragacanth)		Immune-potentiating; speeds metabolism	Subject to bacterial degradation when used as a component of denture adhesive	None
Bilberry	Class 1	Treats mild inflammation of the mucous membranes; as a tea to treat diarrhea; glaucoma, diabetic retinopathy	May cause diarrhea is some individuals, therefore, if it persists 3-4 days it should be discontinued. Caution against use with antibiotics in dentistry potentiating diarrhea	It is anti-inflammatory. Effects may be seriously inhibited by Phenobarbital, other sedatives and hyptnotics..
Cascara sagrada		Laxative/cathartic	Potassium may be lost, potentiating coagulation problems.	Cathartic-induced hypokalemia increases toxicity and potentiates muscle relaxants.
Cat's Claw (Uña de gato); also known as Peruvian Cat's Claw		Immune stimulant, anticancer	None	None
Cranberry		Treats urinary tract infections; chronic pyelonephritis	None	None
Dong Quai/Chinese Angelica		Manage pain from traumatic injury; improve circulation; the most important female tonic remedy in Chinese medicine for overcoming fatigue and myriad gynecological, menstrual and menopausal symptoms.	Excessive doses interfere with coumarin-based anticoagulant therapy; raely causes photosensitivity and dermatitis; may potentiate skin cancer; may raise blood glucose levels	Hypotensive effects may be further potentiated by analgesic drugs such as propoxyphene HCl and nalbuphine HCl
Echinacea	Class I	Treat infection, boost immunity. Caution: may be contraindicated in presence of TB, Lupus, MS, AIDS, HIV and other progressive infections or autoimmune diseases.	Possible tongue numbness; possible aggravation of autoimmune illness (lupus) and progressive diseases (TB, MS)	Anti-inflammatory activity of herb can be seriously inhibited by phenobarbital as well as other sedatives and hypnotics including chloral hydrate and meprobamate.
Eleuthero/Siberia n Ginsend	Class I	An adaptogen; improves appetite, prevents respiratory tract infection, colds and flu via stimulation of immune system; energy-enhancing effect improves endurance; enhances ability to manage stress.	Avoid if blood pressure is elevated; irritability may complicate delivery of care; discontinue if high fever (30°C) present	It may improve efficacy of antibiotics, probably due to enhancement of T-lymphocyte activity
Feverfew	Class 2b	For migraine headaches, arthritis, premenstrual and menstrual discomfort; to treat fevers	In sensitive patients, mouth ulcers, dry and sore tongue, swollen lips and mouth, loss of taste, unpleasant and bitter taste can result from chewing fresh leaves or seeds; also, nausea, vomiting, diarrhea; post-feverfew syndrome; nervousness, tension headaches, insomnia, stiffness/pain in joints, tiredness.	May interfere with blood clotting[7]; avoid concurrent use of aspirin and NSAIDS

Table 3 *Continued from Page 603*

Herbal Supplement	AHPA Rating	Use	Precautions in Dentistry	Dentally significant drug interactions
Garlic	Class 2c	Lowers LDL cholesterol and triglycerides while increasing HDL cholesterol; lowers blood pressure; broad spectrum antibiotic, -fungal, -viral, -parasitic, etc.	Possible increased bleeding via interference with anticoagulant therapy; rarely, burning sensation in mouth; halitosis.	Possibly potentiate the antithrombotic effects of aspirin or other NSAIDs.
Ginger	Class 1 (fresh root) Class 2b (dried root)	Very effective antibiotic; strong antioxidant. Prophylactically for motion sickness, to treat digestive disorders, menstrual cramps, nausea, vomiting (the latter via local action on stomach receptors rather than through CNS effect) and many other uses.	If taken presurgically to counteract post-surgical nausea, be aware that ginger may decrease platelet aggregation (via inhibition of thromboxane A_2 synthesis) leading to increased bleeding	Possible increased bleeding if given with NSAIDS (aspirin)
Ginkgo biloba	Class 2d	The leaf and extract are used to improve cerebral and peripheral circulation, resulting in improved memory, enhanced concentration and hearing.	Possible bleeding due to its inhibition of platelet aggregation. Mild GI upset and headache, occasional vomiting, nausea.	Caution: if prescribing aspirin or other NSAIDS.
Ginseng (Panax-Chinese or Korean)	Class 2d	Fights fatigue, improves concentration, enhances healing, generally increases ability to tolerate stress, recuperate, improve performance. The principal male adaptogen in Chinese Medicine. Reports in JAMA exaggerate cautions regarding this herb	Ginseng Abuse Syndrome (GAS)10 including diarrhea, hypertension, nervousness, skin eruptions and sleeplessness. Contraindicated if acute hemorrhage may occur in surgical procedures. Altered clotting due to effect on platelet adhesion and blood coagulation, especially patients on warfarin.	None
Goldenseal		Treat digestive disorders; anti-inflammatory; promotes wound healing	Increased saliva production; irritation of mouth and throat in high doses; also, may increase blood pressure.	Anti-inflammatory activity of herb can be seriously inhibited by phenobarbital and certain other sedatives and hypnotics (including chloral hydrate and meprobamate).
Grapeseed extract (may be sold as Pychogenol)		Maintains healthy microvasculature and skin	None	None
Red pepper (Capsicum, Capsaicin), cayenne red pepper		Stimulant, promotes blood circulation, enhances digestion; used externally to reduce pain of arthritis and shingles, principal component of self-defense (pepper) sprays. Sometimes used in dentistry to treat burning tongue.	None	None
Saint John's wort	Class 2d	Treats depression, anxiety; anti-inflammatory in the gut and respiratory tract; kidney diuretic; eases menstrual cramps; anti-viral against enveloped viruses; regarded as "unsafe" by the FDA but toxicity in humans is very poorly substantiated.	Photosensitivity in extreme cases such as high, prolonged dose and excessive sun exposure; sleeping time of narcotics is enhanced	In an undetermined manner may cause added photosensitivity to tetracyclines; possible additive effect of narcotics relative to drug as pts depression disease, inhibits MAO inhibitors.

Chart Continued on Page 606

Table 3 *Continued from Page 605*

Twenty Popular Herbal Medicines (Listed Alphabetically). Uses, Dental Precautions and Drug Interactions

Herbal Supplement	AHPA Rating	Use	Precautions in Dentistry	Dentally significant drug interactions
Saw Palmetto	Class 1	Mild diuretic to treat of early benign prostatic hypertrophy.	None	Salicylates and tetracycline may inhance antidiabetic actions of the herb. Management of genitourinary problems, increase sperm production, sexual vigor, breast size via estrogenic effects via its diuretic action may potentiate effects of glucose-elevating agents, antihypertensives, etc.
Valerian	Class 1	Calming, faciltiates sleep	None	Possible additive effect of benzodiazepines (Valium).

*The top six six selling herbs in 1999 were ginkgo biloba, echinacea, St. John's wort, ginseng, garlic and saw palmetto, Personal communications via Website: www.nutritionbusiness.com

[7]Feverfew affects mediators of platelet aggregation (i.e., arachidonic acid metabolites). (p9 Prescriber's Letter Part1)

[10]This syndrome has been reported in a very small sample of patients. Mark Blumenthal, world-renowned spokesperson of the American Botanical Council and principal author of The Complete German Commission E Monographs; Therapeutic Guide to Herbal Medicines, Austin, TX 1998, disputes the notion, in part because Ginseng preparations are notorious for containing contaminants.

Asian (Panax) ginseng. When herbs and prescription drugs have similar biologic and/or pharmacokinetics, the potential for adverse effects is multipliedf.

Another risk with herbal supplements, as with exposure to nearly all substances, is that of an allergic reaction that can manifest in the oral mucous membranes, gingiva, tongue, or elsewhere. Finally, since the self-dosing of herbal supplements is potentially more variable than with doctor-prescribed medications, there is a distinct possibility that patients may use "too much of a good thing," with unpredictable effects.

Discussion

Based on a review of the effects and side effects of these 20 herbal medications and the paucity of reports in the literature, the authors have concluded that there are a few significant herb-drug adverse drug reactions secondary to dental therapy and that, by-and-large, these problems are uncommon. A separate table (**Table 5**) delineates some of the more common herb-dental drug interactions with which the dentist should be familiar.

As always, dentists need to be vigilant regarding the potential for adverse drug reactions. Such problems may increase when patients taking high doses of herbs for prolonged periods undergo dental procedures that are physiologically stressful, such as dental extractions or periodontal surgery. The type of patient at greatest risk is a patient who is physiologically debilitated or who is on any type of medication that is closely titrated to ensure that it is in the proper physiologic/therapeutic range. Patients taking anticoagulants, some cardiac medications, antidepressants, and some diabetic drugs are at particular risk.

The most important first step in preventing any adverse drug reactions is to identify which conventional and/or natural therapies the patient is using. That information should be gathered as part of a good health history and laboratory tests as necessary to identify all relevant medical problems (**Table 6**). Appropriate evaluation of health status is fundamental to preventing future problems. In that regard, studies have shown that a surprising number of individuals are taking alternative products.[2,3] These studies have also documented that, for a variety of reasons, these patients do not inform their dentist or physician that they are taking these therapies.[2,3] Because of this lack of reporting, patients should be asked, either directly or as part of the health history form, about the use of herbal products. To facilitate this communication, the health care provider must ensure that the health history interview environment and

TABLE 4.

Cumulative Adverse Drug Reaction Ratings Based on Combined Severity and Documentation Ratings.[6]

Ratingc	Definition
1	Major reactions that are established, probable, or suspected.
2	Moderate reactions that are established, probable, or suspected.
3	Minor reactions that are established, probable, or suspected.
4	Major or moderate reactions that are possible.
5	Minor reactions that are possible; all reactions that are unlikely.

interview questions are nonjudgmental relative to alternative dental and medical therapies. It is appropriate to specifically ask whether the patient is taking any natural, alternative, or complementary therapies, products or medications. When asked, patients are more likely to cooperate if the dentist is able to discuss why that information is relevant to being able to deliver safe and efficacious dental care. By following the protocol in **Table 6**, the dentist should effectively elicit potential drug-herb reactions of major concern.

Summary

In summary, some patients, especially those with chronic diseases, are using over-the-counter or provider-prescribed herbs and nutraceuticals. Patients using these agents may or may not alter their use of prescription medications, creating a potential for interactions between the herbs and their prescription drugs. Such interactions may bear directly or indirectly on a patient's dental management. The dental practitioner should be aware of the most common herbal preparations and their effects, side effects and adverse drug reactions. There are more than a dozen other popular herbs and many other nutraceuticals that have not been evaluated here but may be the subject of a future article.

The practitioner should also create a nonjudgmental office environment and an appropriate health history form to ensure that vital information about the patient's utilization of complementary drugs such as herbs as well as other treatment modalities is elicited. The medical history should include one or more queries regarding your patient's use of herbs, vitamins, and other nutraceuticals. When appropriate, precautions should be taken such as medical consultations and blood coagulation studies. Finally, it is imperative to advise patients regarding discontinuation of herbal supplements, especially if any moderate to major adverse drug reactions with any drugs the dentist plans to prescribe are established, probable, or suspected.

Notes

a. Herbs and natural therapeutic products derived from them are classified as "food supplements" by the Food and Drug Administration, and they are referred to throughout this paper as herbs, herbal supplements or herbals. The dentist should be aware that some of the confusion surrounding their uses, efficacy, side effects, etc. is due to differences in the chemical agents present or absent and their concentrations in various preparations of the whole herb and its derivatives. Statements in the lay and medical literature suggesting that herbs are used by patients only to support health or for mild and/or chronic illness are also very misleading and completely discount the fact that some of the most potent prescription medications in the world pharmacopoeia, namely, digitalis, morphine and opium, are derived from plants. That herbs have medicinal actions is recognized worldwide; indeed, they are referred to as phytomedicines (phyto = plant) in Germany.

b. According to Integrative Medicine Communications, publisher of The Integrative Medicine Consult newsletter, in 1995 in Germany some 7 percent of prescription drugs covered by German health insurance were herbal preparations and in 462 monographs covering 360 herbs the German Commission E (equivalent to our FDA) had sorted the herbs into two groups: positive (expected to be safe and useful) and negative (expected to pose safety risks or to have no therapeutic effect).

c. See Consumerlab.com for results of tests on ginkgo biloba and saw palmetto products and DrTheo.com for results of Dr. Jason Theodosakis' tests on glucosamine/chondroitin products.

d. In this regard, the dentist may wish to consult the Web site of the European Scientific Cooperative on Phytotherapy, which publishes peer-reviewed meta-analysis monographs seeking to establish a pan-European standard for the therapeutic use of botanical drugs throughout the European Union. The Web address is www.exeter.ac.uk/phytonet. If the dentist is seeking a source closer to home, the American Herbal Products Association has developed a four-category safety rating guide. See Table 2 for a complete description of each classification.

e. The latest survey, published by NBJ in mid-March 2000, reflects results to December 1999. For the second year in a row, echinacea has been displaced by ginkgo biloba, and St. John's wort has vaulted from 17th place to third place in total sales in four years.

f Moore PA, et al. The previously referenced JADA article differentiates interaction responses as "summation" (increased, when drugs with similar effects are administered together) or "synergism" (exaggerated increase greater than could be achieved by either drug administered alone at its maximally effective dose).

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Table 5

Dental Drug-Herbal Supplement Considerations

Dental Drug	Herbal Supplement(s)	Considerations
Diazepams, including benzo-, and lorazepam and alprazolam	Tobacco	May reduce calming effects of diazepam
	Goldenseal, kava, St. John's wort, valerian	Due to sedative properties of herbs, effects of diazepam may be intensified
	Kava	Extreme synergism may cause coma and death
Erythromycin, penicillin VK, amoxicillin	Ginger	May hinder absorption of erythromycin
	Siberian ginseng	May enhance antibiotic effect
	White willow bark (and other salirylates)	May increase absorption of antibiotics
Fluconazole	Garlic, ginger, lemon balm (melissa)	Antifungal properties of herbs may intensify action of fluconazole
NSAIDS	Feverfew	May interfere with feverfew via prostaglandin inhibition effects
	Cayenne, feverfew, garlic, ginger, ginkgo, ginseng	May heighten risk of bleeding due to coincident gastric irritation
Prednisone, methylprednisolone	Ephedra (ma huang)	Potentiates clearance of steroid thereby reducing its effectiveness
	Licorice	May decrease steroid clearance and thereby enhance its duration of activity and/or potentiate side effects
Propoxphene hydrochloride	Chamomile, black cohosh, saw palmetto, St. John's wort, valerian	Sedative properties of herb may intensify propoxyphene's effects
	Ephedra (ma huang)	May decrease metabolism of herb there by potentiating ephedra's effects and toxicity
	Astragalus, donquai, parsley, psyllium, sage and others	Due to these herb's hypotensive properties, a hypotensive crisis could be potentiated

Source: Nutri-Link™, The JAG Group

www.jag-group.com

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TABLE 6.

Screening Methods to Prevent Adverse Herb-Other Drug Reactions

Adequate health history, completed by patient, that lists the signs and symptoms of specific diseases and ongoing or prior therapies that can have an impact on dental management.

Questions related to the use of herbs:

1. How long have you been utilizing one or more herbal products?

2. Are you using any herbs specifically for the following purposes?

To promote oral health (teeth, gingiva, mucosa, bone, etc.)

To help manage oral health problems (such as infection, trauma)

3. Describe any side effects or unexpected reactions you have experienced while taking herbs.

4. Which herbs do you utilize on a regular basis (one or more times per week). (Include items such as echinacea, garlic, green tea, etc.)

5. Please indicate the dose and frequency of use of each herb you are utilizing regularly.

6. Have you discontinued the use of any herb product, and if so, why did you do so?

7. Have you substituted herbs for or combined them with over-the-counter or prescription drugs?

Note: Remarks, such as those below in quotations, help the patient to understand the reasons that answers to questions about their use of herbal supplements are important.

"Thank you for your cooperation in completing this health questionnaire. Given our awareness of certain side effects and adverse reactions associated with the use of herbs alone and/or in combination with prescription drugs, we continue to strive to minimize your risks and to provide you safe and effective dental care."

Health history interview, completed by the dentist, that reviews the specific categories such as cardiovascular, infections, hematologic, medications, and allergies that have the most likely impact on dental management.

Laboratory tests, or medical referral, as needed to reveal specific signs and symptom findings, indication of disease, and confirm proper medical control/management such as drug regimen modifications with anticoagulant therapy.

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Local Anesthetics
Local Anesthetics and Medically Complex Patients

Alan W. Budenz, MS, DDS, MBA

ABSTRACT As the population ages and medical science advances, more and more patients with complex medical histories will be seeking care in private dental practices. This paper will review a variety of disease entities as well as potential drug interactions pertinent to the use of local anesthetic agents in medically complex patients.

AUTHOR

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Through steady advances in medical care, many patients who even a short time ago would not have survived systemic illnesses, or at best would have been confined to their beds or homes, are now active, mobile members of our society. As a result, patients with increasingly complex medical situations are in a position to seek dental treatment in private practice offices. The dentist must be prepared to deliver safe, efficient, and competent dental care by understanding the patient's medical condition and medications. This information must be integrated into the dentist's knowledge of the physiologic stresses of dental procedures and the pharmacology of the medications used in dentistry.

The injection of local anesthetic solutions to achieve anesthesia is one of the most commonly performed dental procedures. Prior to administering any medication, including local anesthetics, it is appropriate for the dentist to take a complete medical history and follow up any questions with the patient or by a consultation with the patient's physician.

Though local anesthetics are remarkably safe at therapeutic doses, the practitioner treating medically complex patients must address two basic concerns pertinent to the use of local anesthetic agents: existing systemic diseases that may be exacerbated by the anesthetic agent and medications that may have adverse interactions with local anesthetic agents. This review will focus on a broad range of medical problems and considerations for the use of local anesthetics in these patient populations.

TABLE 1.
Summary of Local Anesthetic Use in Medically Complex Patients

DISEASE	PRECAUTIONS
Cardiovascular disease	**Use stress-reduction protocol.**
Hypertension (controlled)	Minimize vasoconstrictor use.
Nonselective beta-blockers (propranolol)	Avoid vasoconstrictors.
Selective beta-blockers (Lopressor)	Minimize vasoconstrictor use.
Other antihypertensive drugs (Clonidine, Aldomet, Reserpine)	Minimize vasoconstrictor use; monitor for injection site ischemia.
Angina and post-myocardial infarction	Minimize vasoconstrictor use.
Cardiac dysrhythmia (refractory)	Minimize vasoconstrictor use; avoid PDL & intraosseous injections.
Congestive heart failure (controlled)	Minimize vasoconstrictor use.
Digitalis glycosides (Digoxin)	Monitor for arrhythmias if using vasoconstrictor.
Long-acting nitrates and vasodilators (Nitroglycerin, Isordil, Minipres)	Watch for decreased anesthetic duration.
Cerebrovascular accident (stroke)	No special precautions.
Pulmonary Disease	
Asthma	Stress reduction protocol; minimize vasoconstrictor use.
Chronic obstructive pulmonary disease	No special precautions.
Renal Disease (severe)	Reduced dosage; extend time between
injections.	
Hepatic Disease (severe)	Reduced dosage; extend time between injections
Pancreatic Disease	
Diabetes	Stress-reduction protocol.
Adrenal Disease	
Adrenal insufficiency	
Stress-reduction protocol.	
Pheochromocytoma	Avoid vasoconstrictors.
Thyroid Disease	
Hyperthyroidism (controlled or euthyroid)	
No special precautions.	
Hypothyroidism (mild)	No special precautions.
Musculoskeletal Disease	
Malignant hyperthermia	No special precautions.
Blood Dyscrasias	
Sickle cell anemia	Stress reduction protocol; minimize vasoconstrictor use.
Methemoglobinemia	Avoid prilocaine (Citanest).
DRUG INTERACTIONS	**PRECAUTIONS**
Antipsychotic drugs (Thorazine)	No special precautions.
Cocaine	Delay treatment for six to 72 hours.
Tricyclic antidepressants (Elavil)	Minimize epinephrine; avoid levonordefrin.
Monoamine oxidase inhibitors	No special precautions.
Antianxiety drugs (benzodiazepines)	Minimize all anesthetics.

Cardiovascular Diseases

Local anesthetic agents themselves can affect the cardiovascular system, especially at higher doses. Cardiovascular manifestations are usually depressant and are characterized by bradycardia, hypotension, and cardiovascular collapse, potentially leading to cardiac arrest. The initial signs and symptoms of depressed cardiovascular function commonly result from vasovagal reactions (dizziness and fainting), particularly if the patient is in an upright position.[1,2] Cardiovascular diseases constituting contraindications to the use of local anesthetics in general, and to the use of vasoconstrictors in local anesthetics in particular, are often discussed in terms of absolute as opposed to relative contraindications.[3] Absolute contraindications for the use of local anesthetics with or without vasoconstrictors in patients with cardiovascular diseases exist only if the patient's condition is determined, by the dentist's review of the health history, to be medically unstable to the degree of posing undue risk to the patient's safety. Dental care should be deferred in these patients until their medical conditions have been stabilized under the care of their physicians. For patients with stabilized cardiovascular diseases, dental treatment may usually be delivered in near routine fashion,[4] although, as the following sections will emphasize, the amount of vasoconstrictor-containing local anesthetic used may need to be limited and the patient carefully monitored.

Hypertension

It is estimated that more than 50 million people in the United States have high blood pressure or are taking antihypertensive medications.[5,6] Because lack of compliance is a major problem in medical treatment of hypertensive patients, the dental practitioner is wise to measure blood pressure and evaluate the patient's status at every visit.

The decision regarding whether or not a local anesthetic agent containing

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vasoconstrictor should be administered to a patient with hypertension or other cardiovascular disease is a common concern amongst dental practitioners. A rational approach to this question is to recall the effects and mechanism of action of the vasoconstrictors. One of the primary effects, and advantages, of vasoconstrictors in dental local anesthetics is to delay the absorption of the anesthetic into the systemic circulation. This increases the depth and the duration of anesthesia while decreasing the risk of toxic reaction. Additionally, the vasoconstrictor provides local hemostasis. Epinephrine and levonordefrin (neo-cobefrin) are the two vasoconstrictor agents commonly used in dental local anesthetic formulations. Although they do have slightly differing cardiac effects, they carry the same precautions for their use.

There are no absolute contraindications to the use of vasoconstrictors in dental local anesthetics, since epinephrine is an endogenously produced neurotransmitter.[7] In 1964, the American Heart Association and the American Dental Association concluded a joint conference by stating that "the typical concentrations of vasoconstrictors contained in local anesthetics are not contraindicated with cardiovascular disease so long as preliminary aspiration is practiced, the agent is injected slowly, and the smallest effective dose is administered."[8] It has long been recommended that the total dosage of epinephrine be limited to 0.04 mg in cardiac risk patients.[9,10] This equates to approximately two cartridges of 1:100,000 epinephrine-containing local anesthetic. Levonordefrin is considered to be roughly one-fifth as effective a vasoconstrictor as epinephrine and is therefore used in a 1:20,000 concentration. In this concentration, levonordefrin is considered to carry the same clinical risks as 1:100,000 epinephrine.10 The results of a number of studies[11-17] indicate that the use of one to two 1.8 ml cartridges of local anesthetic containing a vasoconstrictor is of little clinical significance for most patients with hypertension or other cardiovascular diseases, and that the benefits of maintaining adequate anesthesia for the duration of the procedure far outweighs the risks.

However, the use of more than two cartridges of local anesthetic with a vasoconstrictor should be considered a relative rather than an absolute contraindication. If, after administering one to two cartridges of vasoconstrictor-containing local anesthetic with careful preliminary aspiration and slow injection, the patient exhibits no signs or symptoms of cardiac alteration, additional vasoconstrictor-containing local anesthetic may be used, if necessary, or local anesthetic without epinephrine can be used. Some practitioners prefer to achieve initial anesthesia with a nonvasoconstrictor-containing anesthetic agent such as 3 percent mepivacaine or 4 percent prilocaine plain and then use a small amount of local anesthetic with vasoconstrictor to supplement cases of inadequate anesthesia. While this is a viable protocol, a safer choice is to use a minimal amount of vasoconstrictor-containing local anesthetic first and then supplement as necessary with nonvasoconstrictor-containing agents. The advantage of using the epinephrine-containing anesthetic first is that it will minimize blood flow in the injection site, thereby holding the local anesthetic in place, optimizing the anesthetic effect while minimizing the rate of plasma uptake and potential toxicity.[10] Since nonvasoconstrictor-containing local anesthetics produce localized vasodilation, addition of a vasoconstrictor-containing agent after first injecting with a nonvasoconstrictor-containing local anesthetic can be expected to produce increased cardiovascular alterations. The goal should always be to minimize the dosage of local anesthetic with or without vasoconstrictor; but if additional vasoconstrictor will provide improved pain control for the dental procedure, it is not contraindicated.

If a patient has severe uncontrolled hypertension, elective dental treatment should be delayed until his or her physician can get the blood pressure under control. But if emergency dental treatment is needed, the clinician may elect to sedate the patient with valium and use one to two cartridges of local anesthetic with a vasoconstrictor. This dose will have minimal physiologic effect and will provide prolonged anesthesia. The greater risk in such a scenario is that without the epinephrine the anesthesia will wear off too soon and the endogenous epinephrine produced by the patient, because of pain from the dental procedure, will be much greater and more detrimental than the

TABLE 2.

Stress Reduction Protocol

- Morning appointments are usually best.
- Keep appointments as short as possible.
- Freely discuss any questions, concerns, or fears that the patient has.
- Establish an honest, supportive relationship with the patient.
- Maintain a calm, quiet, professional environment.
- Provide clear explanations of what the patient should expect and feel.
- Premedicate with benzodiazepines if needed.
- Ensure good pain control through judicious selection of local anesthetic agents appropriate for maintenance of patient comfort throughout the procedure.
- Use nitrous oxide as needed (avoid hypoxia).
- Use gradual position changes to avoid postural hypotension.
- End the appointment if the patient appears overstressed.

small amount of epinephrine in the dental anesthetic cartridge.[15,18]

Another concern for the dental practitioner is the possibility of an adverse interaction between the local anesthetic agent and a patient's antihypertensive medication, particularly the adrenergic blocking agents. The nonselective beta-adrenergic drugs, such as propranolol (Inderal), pose the greatest risk of adverse interaction.[19] In these patients, an injection of vasoconstrictor-containing local anesthetic may produce a marked peripheral vasoconstriction, which could potentially result in a dangerous increase in blood pressure due to the pre-existing medication-induced inhibition of the compensatory skeletal muscle vasodilation. This compensatory skeletal muscle vasodilation normally acts to balance the peripheral vasoconstriction effects in nonmedicated patients. The cardioselective beta blockers (Lopressor, Tenormin) carry less risk of adverse reactions. Both classes of beta blockers may increase serum levels of anesthetic solutions due to competitive reduction of hepatic clearance.[20] Though these considerations are theoretically important, there is still little risk of a problem if the total dose of anesthetic, with 1:100,000 epinephrine or its equivalent, is limited to one to two 1.8 ml cartridges.

Other antihypertensive medications, such as the central sympatholytic drugs, for example Clonidine and Methyldopa (Aldomet), and the peripheral adrenergic antagonists such as Reserpine as well as the direct vasodilators, may potentiate adrenergic receptor sensitivity to sympathomimetics, resulting in a magnified systemic response to vasoconstrictor-containing anesthetics.[19] However, once again, these medications pose no significant risk as long as the vasoconstrictor-containing anesthetic is limited to one to two 1.8 ml cartridges. An additional reminder to inject vasoconstrictor-containing local anesthetics slowly is appropriate due to the increased risk of injection site ischemia resulting from the potentiated localized vasoconstrictor effect.

Angina Pectoris and Post-Myocardial Infarction

Patients with stable angina without a history of infarction generally have a significantly lower risk of adverse reactions to dental anesthetics than do patients with unstable angina or a history of recent (less than six months prior) myocardial infarction. Stress and anxiety reduction play a crucial role in management of these patients, and excellent pain control throughout the dental procedure is essential. The use of local anesthetics containing a vasoconstrictor is recommended as part of the stress reduction protocol for these patients (**Table 1**). The dosage of the vasoconstrictor should be limited to that contained in one to two 1.8 ml cartridges of vasoconstrictor-containing anesthetic. For patients with unstable angina, recent myocardial infarction (less than six months), or recent coronary artery bypass graft surgery (less than three months), elective dental treatment should be postponed.[3] If emergency treatment is required, stress-reduction protocols with antianxiety agents are appropriate, and the above limitation of one to two cartridges of vasoconstrictor-containing anesthetic must be strictly observed.[21]

Cardiac Dysrhythmia

Proper identification of patients with an existing cardiac dysrhythmia, commonly called arrhythmias, or those patients who may be prone to developing dysrhythmia, is essential and requires a physician consult to determine the current status. Patients with coronary atherosclerotic heart disease, ischemic heart disease, or congestive heart failure are susceptible to stress-induced cardiac dysrhythmias. Stress- and anxiety-reduction protocols are again of paramount importance. Local anesthetic agents containing vasoconstrictors are appropriate for maintenance of adequate pain control during dental procedures. Elective dentistry should be avoided in patients with severe or refractory dysrhythmias until their physician can get the problem under control. Once again, it is reasonable and safe to limit the total dose of local anesthetic to no more than two 1.8 ml cartridges per appointment.19 The use of periodontal ligament or intraosseous injections using a vasoconstrictor-containing local anesthetic is not recommended in these patients.[22]

Congestive Heart Failure

Patients who are under physician care and well-controlled with no complications can be treated relatively routinely. Limitation of vasoconstrictor dosage to two 1.8 ml cartridges of vasoconstrictor-containing anesthetic is advised. Patients taking digitalis glycosides, such as digoxin, should be carefully monitored if vasoconstrictors are used since interaction of the two drugs may precipitate dysrhythmias. Additionally, patients taking long-acting nitrate medications, such as nitroglycerin, Isordil, or Isorbid, or taking a vasodilator medication such as Minipres may show decreased effectiveness of the vasoconstrictor in local anesthetics, and therefore shorter anesthesia duration.[21]

Cerebrovascular Accident

Atherosclerosis, hypertensive vascular disease, and cardiac pathoses such as myocardial infarction and atrial fibrillation are commonly associated with the occurrence of strokes. A patient who has suffered a stroke is at greater risk for having another one than is a patient who has never had one. It is recommended that dental treatment be deferred for six months following a stroke because of the increased risk of recurrent strokes during this period. After six months, dental procedures may be provided with the use of vasoconstrictor-containing local anesthetics where required for adequate pain control. If the stroke patient has associated cardiovascular problems, the dosage of local anesthetic with vasoconstrictor should be minimized in accordance with the guidelines for their specific cardiovascular disease.[21]

Pulmonary Disease

The most common pulmonary diseases encountered in the dental office are asthma, tuberculosis, and chronic obstructive pulmonary disease, which includes chronic bronchitis and emphysema. While the status of tuberculosis infection in a patient is of the utmost concern to dental practitioners, and the patient's infection must be under control before elective dentistry is done, it poses no implications with regard to the use of dental local anesthetics.

Asthma

Dental management of asthmatic patients is primarily aimed at prevention of an acute asthma attack. Knowing that stress may be a precipitating factor in asthma attacks, adherence to stress-reduction protocols is again essential and implies the judicious use of local anesthetics containing vasoconstrictors when the planned procedure requires extended depth and duration of anesthesia. However, caution has been recommended based upon Food and Drug Administration warnings that drugs containing sulfites can be a cause of allergic reactions in susceptible individuals.[23] Studies suggest that sodium metabisulfite, which is used as an antioxidant agent in dental local anesthetic solutions containing vasoconstrictors to prevent the breakdown of the vasoconstrictor, may induce allergic, or extrinsic, asthma attacks.[24] Data on the incidence of this problem occurring is limited, and suspicion is that it is probably not a common reaction even in sulfite-sensitive patients since the amount of metabisulfite in dental anesthetics is quite small. Indications are that more than 96 percent of asthmatics are not sensitive to sulfites at all; and those who are sensitive are usually severe, steroid-dependent asthmatics.[25] As Perusse and colleagues conclude, 'we believe local anesthetic with vasoconstrictor can be used safely for nonsteroid-dependent asthma patients. However, until we know more about the sulfite sensitivity threshold, we recommend avoiding local anesthetic with vasoconstrictors in corticosteroid-dependent asthma patients on account of a higher risk of sulfite allergy and the possibility that an accidental intravascular injection might cause a severe and immediate asthmatic reaction in the sensitive patient."[26]

Chronic Obstructive Pulmonary Disease

The two most common forms of chronic obstructive pulmonary disease, characterized by chronic irreversible obstruction of ventilation of the lungs, are chronic bronchitis and emphysema. Patients with chronic obstructive pulmonary disease already have decreased respiratory function, making it mandatory that the dental practitioner take every precaution to avoid further respiratory depression. There are no containdications to the use of therapeutic doses of local anesthetics in these patients. However, any patient with chronic obstructive pulmonary disease who also suffers from coronary heart disease and/or hypertension must be managed in accordance with the guidelines provided for those diseases.

Renal Disease

In general, drugs excreted by the kidney, such as dental local anesthetics, may not be metabolized and cleared from the blood stream as quickly as normal in the presence of renal disease. Total anesthetic dosage may need to be reduced and the interval of time between subsequent injections may need to be extended. Though this is a consideration, it is not a factor in most dental procedures provided the total local anesthetic dosage is kept to a safe minimum.[10]

Hepatic Disease

For patients with known liver function impairment, drugs metabolized by the liver should be avoided if possible, or the dosage at least decreased. Since all of the amide local anesthetics are primarily metabolized in the liver, the presence of liver disease and the status of liver function are important to the dentist.[27] A history of hepatitis infection is not uncommon in most dental office patient pools. In completely recovered patients, local anesthetics may be administered routinely. However, patients with chronic active hepatitis or with carrier status of the hepatitis antigen must be medically evaluated for impaired liver function. Local anesthetics may be used in these patients, but it is recommended that the dose be kept to a minimum.

In patients with more advanced cirrhotic disease, metabolism of local anesthetics may be significantly slowed, leading to increased plasma levels and greater risk of toxicity reactions. Total anesthetic dosage may need to be reduced and the interval of time between subsequent injections may need to be extended. In these cases, initial injection with rapid-onset anesthetics such as lidocaine or mepivacaine followed by injection with a long-acting anesthetic like etidocaine or bupivacaine may be the best protocol for limiting total anesthetic dosage while achieving adequate pain control duration.

Cimetidine (Tagamet) has been shown to significantly reduce the metabolic clearance of amide local anesthetics through the liver. However, the probability of cimetidine and therapeutic doses of local anesthetic interacting to produce a toxic level of local anesthetic in the blood stream is unlikely and unreported.7 Other histamine H2-receptor antagonist drugs such as ranitidine (Zantac) or famotidine (Pepcid) do not share cimetidine's metabolic inhibition of liver enzymes.

Pancreatic Disease

Diabetes

Patients with either Type I insulin-dependent diabetes mellitus or Type II non-insulin-dependent diabetes mellitus, can generally receive local anesthetics without special precautions if control of their disease is well-managed.[26] Consultation

with a patient's physician, as well as frank discussion with the patient, can determine the current status and what, if any, precautions are needed. Stress-reduction protocols, including excellent pain control, are of paramount importance and use of local anesthetics with vasoconstrictors is recommended when appropriate as long as the dosage is kept to the minimum needed. Special caution should be used for patients with Type I diabetes who are being treated with large doses of insulin. Some of these patients, so-called brittle diabetics, experience dramatic swings between hyperglycemia and hypoglycemia ;and the use of vasoconstrictors should be minimized due to the potential for vasoconstrictor-enhanced hypoglycemia.[21]

Adrenal Disease

Adrenal Insufficiency

No alteration of local anesthetic use is required for patients with adrenal insufficiency. Of greatest concern for treatment of these patients is the maintenance of good anesthesia during the dental procedure and good postoperative pain control to reduce stress.

Pheochromocytoma

The cardinal symptom of this tumor of the adrenal medulla or of the sympathetic paravertebral ganglia is hypertension due to the increased secretion of endogenous epinephrine from these tissues. These patients are also prone to cardiac dysrhythmias. Due to the risk of potentiating cardiovascular problems, the use of vasoconstrictor-containing local anesthetics is contraindicated in these patients.[26] No elective dental treatment should be rendered until the disease is medically corrected.

Thyroid Disease

Hyperthyroidism

The use of epinephrine or other vasoconstrictors in local anesthetics should be avoided, or at least minimized to one to two cartridges, in the untreated or poorly controlled hyperthyroid patient.[26] Hypertension and cardiac abnormalities, especially dysrhythmias, are common in the presence of excessive thyroid hormones. However, the well-managed or euthyroid patient presents no problem and may be given normal concentrations of vasoconstrictors.

Hypothyroidism

In general, the patient with mild symptoms of untreated hypothyroidism is not in danger when receiving dental treatment. However, patients with mild to severe hypothyroidism may have exaggerated responses to local anesthetics due to the central nervous system depressant effects. Dosage should be kept to a minimum in mild hypothyroid patients, and dental treatment is best deferred in severe hypothyroidism until the patient's condition can be corrected by his or her physician.[21]

Musculoskeletal Diseases

Malignant Hyperthermia

This rare, but potentially fatal, muscle disease was at one time believed to be induced by administration of amide local anesthetics. However, leading authorities, including the Malignant Hyperthermia Association of the United States, do not advise any special precautions for the use of amide anesthetics in patients susceptible to malignant hyperthermia.[28,29]

Blood Dyscrasias

Sickle Cell Anemia

Profound anesthesia as part of a proper stress reduction protocol is essential in management of these patients. The use of vasoconstrictor-containing local anesthetics is considered safe as long as the dosage is limited to one to two cartridges.[30]

Methemoglobinemia

Methemoglobin is hemoglobin that has been oxidized and can no longer bind and transport oxygen. While present in everyone, it normally makes up less than 1 percent of the circulating red blood cells. Increases in methemoglobin levels can be induced by administration of local anesthetic solutions, particularly prilocaine (Citanest), usually when in combination with other medications that also increase the methemoglobin level.[20,31] Examples of common medications that may produce this interaction are Cipro, Bactrim, Septra, Dapsone, Macrodantin, Macrobid, Isordil, Nardil, and nitroglycerin.[32] Patients with methemoglobinemia or taking medications associated with this disease may be safely treated with local anesthetic injections, with or without vasoconstrictors; however, the dosage should be minimized and the use of prilocaine should be avoided.

Drug Interactions

Antipsychotic Drugs (Phenothiazines)

There are no contraindications for use of any local anesthetics, with or without vasoconstrictors, in patients taking lithium for bipolar disease. For bipolar patients taking a phenothiazine type of drug such as chlorpromazine (Thorazine) or risperidone (Risperdal), fluctuations in blood pressure are common. Local anesthetics with vasoconstrictors used in normal amounts usually will produce no adverse effects.[33] However, consultation with the patient's physician is recommended before dental treatment, and the patient should be carefully monitored for possible hypotensive episodes during the appointment.[35]

Cocai2ne

The main concern in patients abusing cocaine is the significant danger of myocardial ischemia, cardiac dysrhythmias, and hypertension. Patients high on cocaine should not be treated in the dental office for a minimum of six hours following the last administration of cocaine,[34] although the longer the time since the last use of

the drug the better, with some researchers recommending deferral of dental treatment for 24 to 72 hours.[7,33,35]

Tricyclic Antidepressants

Although use of tricyclic antidepressant drugs such as imipramine (Tofranil) and amitriptyline (Elavil) is decreasing, they are still prescribed to significant numbers of patients. One to two cartridges of epinephrine-containing local anesthetic can be safely used in patients taking these drugs, however, these patients should be carefully observed at all times for signs of hypertension due to enhanced sympathomimetic effects.33 Levonordefrin-containing local anesthetics are not recommended due to a greater tendency toward hypertension producing receptor potentiation than is seen with epinephrine.[33,35]

Monoamine Oxidase Inhibitors

Dentists have long been cautioned about potential interactions of drugs of this class, for example the antidepressant phenelzine (Nardil), the Parkinson's disease drug selegiline (Eldapryl), and the antimicrobial furazolidone (Furoxone), relative to vasoconstrictor-containing local anesthetics.[33] These cautions were based upon a fear of induction of severe hypertension due to interaction of vasoconstrictor-containing anesthetics with the MAO inhibitors. However, both animal and human studies have failed to yield evidence of such an interaction.[28] Vasoconstrictor-containing local anesthetics may be used without special precautions in patients taking MAO inhibitor drugs.[29,36]

Antianxiety Drugs

Diazepam (Valium), one of the most widely prescribed drugs in the United States, is a potent central nervous system depressant. Dosage of all local anesthetic agents should be kept to the minimum necessary for good pain control in patients taking benzodiazepine antianxiety drugs due to their additive depressive effects.[20]

Summary

Local anesthetics, with or without vasoconstrictors, may be safely used in most medically complex patients. Observance of simple safety guidelines should be universal for administration of local anesthetics to all patients:

- Aspirate carefully before injecting to reduce the risk of unintentional intravascular injection;
- Inject slowly, a maximum rate of one minute per carpule is widely recommended,10,29 and monitor the patient both during and after the injection for unusual reactions;
- Select the anesthetic agent and whether to use it with or without a vasoconstrictor based upon the duration of anesthesia appropriate for the planned procedure; and
- Use the minimum amount of anesthetic solution that is needed to achieve an adequate level of anesthesia to keep the patient comfortable throughout the dental procedure.

Adherence to these simple guidelines will reduce the risk of adverse reactions to the local anesthetic agents themselves or to the vasoconstrictors contained in local anesthetics. A further safety guideline useful for the majority of medically complex patients is to reduce the amount of local anesthetic containing a vasoconstrictor to no more than two 1.8 ml cartridges. If additional anesthetic volume is need to maintain adequate pain control for the procedure, nonvasoconstrictor anesthetics can be used for subsequent injections. However, the use of additional cartridges of vasoconstrictor-containing local anesthetics is not an absolute contraindication in patients who show no sensitivity to vasoconstrictor agents in local anesthetics. **Table 2** summarizes the use of local anesthetic agents for many disease and drug situations encountered in medically complex dental patients.

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Antibiotic Prophylaxis for Selected Implants and Devices

KAREN A. BAKER, RPH, MS

ABSTRACT Certain implants or devices are widely believed to put patients at risk from oral bacteremia. They include but are not limited to intravascular access devices, solid organ transplants, vascular grafts, coronary artery stents, breast implants, and penile prostheses. The purpose of this article is to review the risk of implant or device infection from transient bacteremia of oral origin and to provide recommendations for appropriate dental management. Since dental treatment bacteremias are a very rare cause of metastatic infections, attributing causality to dental treatment procedures can be viewed as unfounded in almost all cases.

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Many types of medically compromised patients may be at risk of distant site infections from transient bacteremia of oral origin. The most widely recognized type of patients are those with cardiac abnormalities who are thought to be at increased risk of infective endocarditis.[1] The significance of dental procedures as a cause of infective endocarditis and the use of antibiotic prophylaxis to prevent it have become increasingly controversial issues.[2-4] Nevertheless, eight versions of American Heart Association guidelines regarding use of antibiotic prophylaxis to prevent infective endocarditis have been published since 1955, and most dental professionals regard them as a standard of care for patients with cardiac abnormalities.[5]

The most frequently encountered types of patients potentially at risk from transient oral bacteremia are those with total joint replacements.[6] There is no data to support any relationship between bacteremias from dental treatment and prosthetic joint infections.[7] However, a number of authors have recommended antibiotic prophylaxis for a small percentage of prosthetic joint patients thought to be at increased risk of late infection. Norden[8] concluded that antibiotic prophylaxis seemed advisable for patients with periodontitis or other dental infections. Thyne and Ferguson[9] proposed that prophylaxis was justifiable for patients who were immunosuppressed by virtue of chronic drug therapy or disease. Deacon and colleagues[10] concluded that antibiotic prophylaxis was also appropriate for patients with risk factors for late infections in total joint replacements. A retrospective study of 3,490 patient records by Waldman and colleagues11 gave further support for the previously cited recommendations. An advisory statement issued by both the American Dental Association and

the American Academy of Orthopaedic Surgeons[12] has brought welcome clarity to this contentious issue. The panel stated that antibiotic prophylaxis is not routinely indicated for most dental patients with prosthetic joints. Dentists are asked to consider a small number of conditions as potential risk factors for late infections. These conditions include immunosuppression by virtue of drug or disease, insulin-dependent diabetes, malnourishment, hemophilia, and a number of joint-related complications including infection and revision. In addition, the first two years after joint replacement surgery is considered a higher risk period for infection.

Many physicians continue to make recommendations that conflict with this advisory statement, so dentists should seek consultation to clarify patient-specific modifiers. If the physician insists upon the use of antibiotic prophylaxis even in the absence of known risk factors, then the physician should write the prescription for antibiotics. Whether physicians who insist upon antibiotic prophylaxis are unfamiliar with the advisory statement or are simply choosing to disagree with the published conclusions is unclear.

There are a growing number of medical conditions for which infection from oral pathogens is a concern. Conditions where oral pathogens have reportedly caused infection by the hematogenous route include immunosuppression from cancer therapy,[13-16] hepatic abscess,[17] brain abscess,[18,19] meningitis,[20] and paraspinal abscess.[21]

Certain implants or devices are widely believed to put patients at risk from oral bacteremia. They include but are not limited to intravascular access devices, solid organ transplants, vascular grafts, coronary artery stents, breast implants, and penile prostheses. The purpose of this article is to review the risk of implant or device infection from transient bacteremia of oral origin and to provide recommendations for appropriate dental management. There are no national or international guidelines nor prospective risk-benefit studies in humans for any of these potential uses of antibiotic prophylaxis. Accordingly, physician recommendations are locally formulated and vary greatly from one part of the country to another. When antibiotic prophylaxis is recommended, the current AHA regimens should be prescribed. However, the use of current AHA regimens for antibiotic prophylaxis not intended to prevent bacterial endocarditis is not approved by the AHA. Issues such as principles of antibiotic prophylaxis[22] and the role dental procedures play in determining the incidence, nature, and magnitude of bacteremia[23] have been extensively reviewed elsewhere and are beyond the scope of this article. Throughout this discussion, the dentist must bear in mind that dental treatment bacteremias are a very rare cause of metastatic infections.[7] To further complicate matters, the odds of a bacteremia emanating from the mouth due to daily patient procedures (eating, brushing, and flossing) are 1,000 to 8,000 times more likely than from dental treatment procedures.[7] Therefore, attributing causality to dental treatment procedures can be viewed as unfounded in almost all cases.

Hemodialysis Arteriovenous Shunts

There are approximately 268,000 patients with end stage renal disease undergoing dialysis (either peritoneal or hemodialysis) this year in the United States.[24] Most of these patients undergo hemodialysis, which requires a vascular access capable of delivering high blood flow. The majority of hemodialysis patients have either a native vein or synthetic graft arteriovenous shunt constructed to provide access to high blood flow. Native vein shunts or fistulas typically involve connection of the radial artery to the cephalic vein and are used in 29 percent of hemodialysis patients.[25,26] Artificially constructed arteriovenous shunts or grafts (bovine or synthetic polytetrafluoroethylene) are usually constructed in the forearm using the brachial artery and cephalic vein and are used in 64 percent of hemodialysis patients.[26] For the 7 percent of patients without suitable arteriovenous access, central venous catheters such as internal jugular vein cuffed and tunneled catheters are used for hemodialysis access.

Infection is the principle cause of morbidity and the second leading cause of death in patients undergoing hemodialysis for end-stage renal disease.[27,28] Bloodstream infections are the major infectious complication and result from repetitive access to the vascular system.[29] Native vein fistulas result in the lowest rate of bacteremia followed by artificial arteriovenous grafts.[30] The highest rates of bacteremia are consistently found in hemodialysis patients with central venous catheters.[29] The concern about transient oral bacteremia is related to the potential for increased risk of two distinct endovascular infections in hemodialysis patients. These infections are infective endocarditis and vascular access device infection.

Vascular access device infections appear to be primarily related to penetration of the device through overlying skin, which results in contamination with staphylococci and streptococci as well as other skin bacteria.[31,32] Bacteremia appears to be an uncommon cause of vascular access device infections[33] but newly placed grafts are at higher risk than established grafts.[34] Ideally, no elective invasive dental procedures should be performed within six weeks of either new graft placement or surgical revision of an established graft.

Hemodialysis patients appear to be at increased risk of infective endocarditis,[35-37] but the causative factors and sequence of events leading to it are unclear. What is clear is that most clinicians that advocate antibiotic prophylaxis prior to bacteremic dental procedures are primarily concerned with preventing infective endocarditis.[38,39] There have been cases of it in which dental procedures were recently performed and oral organisms were isolated,40 but evidence of a consistent

Table 1

Mechanism of Vascular Graft Colonization

- Contamination at time of surgery
- Direct extension from adjacent tissue site
- Hematogenous seeding during bacteremia episode

causal relationship is tenuous at best. A few references continue to suggest that the primary purpose of antibiotic prophylaxis is to prevent vascular access device infections[41,42] but this position is not even as defensible as prophylaxis to prevent infective endocarditis.

Despite the lack of data to support antibiotic prophylaxis for hemodialysis patients,[22] a number of frequently cited authors have recommended this practice until the risk vs. benefit can be more confidently defined.[38,39,43] The dentist should consult the patient's nephrology clinic prior to treatment and should advise the hemodialysis patient that excellent ongoing oral hygiene is probably more important than acute antibiotic coverage in preventing hemodialysis-related infections.[44,45]

Solid-Organ Transplants

Renal transplant patients are the most common type of solid-organ transplant patients encountered in the dental office, with 285,900 transplants performed in 1994 and a five-year survival rate of 80 percent. Next in frequency are liver transplant patients with [34,22]5 performed in 1994 and a five-year survival rate of 70 percent. There were 29,900 heart transplants performed in 1994 with a 70 percent survival rate after five years.[46] A primary goal in organ transplant patients is to prevent or effectively treat infection, which is the most common life-threatening complication of long-term immunosuppressive therapy. A recent review delineated the principles guiding infectious-disease practice in transplantation, emphasizing the prevention and early recognition of infection and the avoidance of drug-related toxic effects.[47]

Since the immunosuppressive regimens used in all forms of solid-organ transplantation are similar (cyclosporine or tacrolimus), there is a consistent timetable for the occurrence of different infections. Therefore, kidney, liver, and heart transplants will be discussed as a group. However, heart transplant patients are at increased risk of developing cardiac valve abnormalities, which could predispose them to endocarditis. The dentist must continually consult with the patient's physician to determine whether antibiotic prophylaxis to prevent endocarditis is deemed necessary.[22] Assuming that elective dental treatment is inadvisable until at least six months or greater after transplantation, only that period will be considered in the following discussion of dental management.

In terms of their infectious disease problems, patients can be divided into three groups. The majority of patients (80 percent) will have a good result with infectious disease problems similar to those of other community members. About 10 percent of patients will have chronic or progressive viral infections (hepatitis B or C, cytomegalovirus, Epstein-Barr virus, papillomavirus), which may cause injury to organs or contribute to cancer.[47] In 5-10 percent of transplant recipients, recurrent or chronic rejection develops, which necessitates increased immunosuppressive dosages. These patients are most likely to develop opportunistic infections and require lifelong prophylaxis with trimethoprim-sulfamethoxazole in addition to safeguards against environmental exposure to various pathogens.[47] The latter two groups of patients would theoretically be at higher risk from transient bacteremias.

Since there is no data demonstrating increased infection risk due to transient oral bacteremias, it seems reasonable to make the antibiotic prophylaxis decision on a case-by-case basis with transplant center consultation. In the past, many centers routinely recommended antibiotic prophylaxis for all transplant patients but increasingly, only those higher risk patients in chronic rejection are considered to be at substantial risk from oral bacteremia.[46] The decision to use antibiotic prophylaxis and the selection of a regimen, if indicated, must be made in consultation with the patient's transplant physician. It is unlikely that patients with stable grafts and good to excellent oral health are at risk from infrequent and brief bacteremias.[22] On the other hand, patients in chronic rejection or those with oral infections may best be protected with a short-term antibiotic regimen prior to invasive dental procedures. Immediate and aggressive treatment of acute oral infections along with meticulous maintenance of soft tissue health would appear to be important strategies in minimizing the risk of infection in all transplant patients.[39]

Vascular Grafts

Many dental patients suffer from one or more cardiovascular conditions that predispose them to vascular damage. Conditions such as hypertension, diabetes, and especially atherosclerosis may lead to peripheral artery occlusion or development of an aneurysm.[48] Over 90 percent of abdominal aneurysms originate below the renal arteries, while aneurysms of the proximal aorta are much less common.[48] Prosthetic vascular graft materials such as Dacron and polytetrafluoroethylene are sutured into

vascular walls to restore circulation or prevent aneurysm rupture.[49]

The reported incidence of vascular graft infections ranges from less than 1 percent to more than 5 percent and varies with the site of graft placement.[50] Grafts implanted in the inguinal area have a higher rate of infection than do grafts that lie entirely within the abdomen.[50] Mechanisms of vascular graft colonization.[50] The predominant organisms found in graft infections are listed in **Table 2**[50] and originate primarily from the bowel or skin. Oral organisms only rarely infect aortic aneurysm grafts,51 but overall mortality rates from such infections range from 25 percent to 88 percent.[49,52,53]

The risk of graft infections from transient oral bacteremia is unknown, but any presumed risk diminishes as the graft incorporates into the host tissue.[50] Pseudointima composed of connective tissue and fibrin begins to form on the inner surface of the graft. True endothelium does form but rarely extends more than 10 mm beyond the anastomosis.[50,52] This process may take three to six months and does not preclude the possibility of late graft infection.[54] Most authors agree that antibiotic prophylaxis is indicated for new grafts of less than six months[50,54,55] but only Lindemann55 recommended antibiotic prophylaxis prior to dental procedures for the life of any synthetic vascular graft. Pallasch[22] suggested an intermediate approach of using antibiotic prophylaxis only for patients with major vessel grafts such as those involving the aorta. Physician consultation to confirm the type, location, and size of the graft along with reinforcement of strict oral homecare would seem prudent.

Coronary Artery Stents

Percutaneous transluminal coronary angioplasty is a widely accepted treatment for coronary artery disease with a more than 90 percent success rate.[56] However, abrupt vessel closure during the procedure and late restenosis limit its effectiveness.[56] Since 1986, intracoronary stent implantation has been used in conjunction with percutaneous transluminal coronary angioplasty to optimize coronary dilation by compressing the irregular disrupted surface of the atherosclerotic plaque resulting from the intervention.[58] The luminal diameter is increased by the expanding force of the stent, which acts against the elastic recoil of the vessel and may lead to further improvement in the vessel lumen beyond that obtained at implantation.[57] However, the presence of a foreign body in the vasculature poses obvious risks including thrombosis or infection. The issue of antithrombotic therapy after intracoronary stenting was recently examined[58] and will not be discussed here.

Infection of the arterial wall subsequent to coronary artery stent placement is exceedingly rare with only two cases reported.[59,60] The infecting organisms were Staphylococcus aureus[59] and Pseudomonas aeruginosa, and neither patient survived. Paget and colleagues[61] recently employed a swine model to determine if 1 gram of intravenous cefazolin would prevent stent/artery complex infections if given before a bacterial challenge at the time of stent placement and four weeks later. The authors also administered the bacterial challenge at three months post stent placement without benefit of antibiotic prophylaxis. In this investigation, S. aureus was the challenge organism because it has been the leading pathogen identified in stent infections at other sites. Antibiotic prophylaxis was definitely protective at the initial placement interval as well as at the 28-day interval. However, the infection rate at the three-month interval was very low. The authors speculated that the mechanism by which stent arteritis occurs and progresses may be based on endothelial denudation from the angioplasty itself. Friction from the expanding metal stent struts could potentially increase this denudation creating an arterial media that could serve as a nidus for bacterial adherence and colonization.[61] Based on the results of their study, Paget and colleagues61 recommended that antibiotic prophylaxis should be routinely administered prior to arterial stent deployment and also prior to invasive procedures where bacteremia may occur for the first three months following stent placement.

These recommendations seem reasonable and do not require the long-term use of antibiotic prophylaxis in coronary artery stent patients. Previous recommendations for possible antibiotic prophylaxis up to six months after stent placement but none thereafter have been published.[1]

Breast Implants

Breast augmentation with saline implants remains a common surgical procedure despite recent controversy surrounding silicone breast implants.[62,63]

Table 2

Which Bacteria Cause Vascular Graft Infections	
Staph. aureus	33%
E. coli	16%
Staph. epidermidis	12%
Streptococci	11%
Proteus sp.	8%

About 50,000 implants per year are performed for reconstructive needs following cancer treatment, and about 90,000 bilateral breast implants are placed each year for esthetic reasons.[6] The postoperative infection rate is 1 percent to 4 percent and S. epidermidis and S. aureus are the most common pathogens.[64] Only one case of late breast implant infection caused by a potentially oral organism has been reported.[65] The patient was young and in good health and had silicone gel implants three years prior to a series of 14 dental procedures over an eight-month period. During the series of dental procedures, three separate courses of oral antibiotic therapy were prescribed by the dentist. Three days after the final dental appointment for crown placement, the patient noted tenderness and diffuse swelling of the right breast. The diagnosis was breast abscess and the patient was placed on cephalexin. Two days later, the implant was removed and the antibiotic therapy was switched to ciprofloxacin subsequent to drainage of 300 ml of yellow, turbid fluid. The organism cultured from the breast drainage was Clostridium perfringens, which is not a component of normal skin flora but is ubiquitous in the intestinal tract and in soil.[66] Cultures of the oral cavity and oropharynx performed after at least five days of antibiotic therapy failed to grow Clostridium perfringens. The authors concluded that breast implant patients should receive antibiotic prophylaxis prior to procedures likely to cause bacteremia and further recommended that the regimen should be aimed at eradication of Staphylococcus species.[65]

Bacteremic breast implant infections are truly rare. The fact that only one case of possible oral organism-related breast implant infection has been reported among the hundreds of thousands of breast implant patients lends credence to that assertion. If bacteremia truly put breast implants at risk of infection, then any woman immunosuppressed by virtue of drug therapy or disease would be an easy target for oral organisms. Hundreds of breast cancer survivors with breast reconstruction implants would presumably be at substantial risk, but no case reports confirm this. Despite the apparently negligible risk, some authors continue to recommend antibiotic prophylaxis prior to invasive dental procedures.[64,65] The prudent dentist should always weigh the risk of prophylactic antibiotic therapy against the potential benefit in a particular group of patients. For the hundreds of thousands of women with breast implants, the decision not to prescribe prophylaxis is clearly justified.[41] If the patient's plastic surgeon is adamant about the necessity of antibiotic prophylaxis, then that physician should write the prescription.

Table 3

Should Vascular Graft Patients Receive Premed?

- Graft infection from bacteremia is rare.
- Highest risk is in "new" graft.
- Pseudointimal formation protects grafts.

PREMED? Indicated for first six months
Longterm required physician consult

Penile Prostheses

There are two types of penile prostheses currently used for erectile dysfunction. The malleable or semi-rigid devices are either pure silicone rubber or contain an intertwined central spring-loaded core that can be locked for activation and unlocked for the flaccid state.[67] The inflatable devices are either self-contained cylinders or so-called two-or three-piece devices. No penile prostheses contain silicone gel,[67] and selection of the appropriate device is based on patient and surgeon preference as well as cost.

Infection is an uncommon but disastrous complication associated with penile prostheses with an incidence ranging from 0.6 percent to 8.9 percent.[67] Patient factors predisposing them to a higher infection risk include spinal cord injury, poorly controlled diabetes, history of urinary tract infections, and replacement device operation.[67,68] A recent prospective trial has challenged the notion that degree of diabetes control correlates with infection risk.[69] The authors concluded that neither elevated fasting blood sugar or insulin dependence increased penile prosthesis infection risk.[69] Most infections occur within three months after implantation, and more than 60 percent of the infections are caused by S. epidermidis.[70] Identification of the source of S. epidermidis infection is further complicated by the fact that patients may remain asymptomatic and functional for up to five years after initial innoculation.[71]

Late infection from hematogenous sources is very rare, with only two such reports in the literature. Carson and Robinson[71] reported three cases of penile prosthesis infection occurring subsequent to either a dental abscess or extensive treatment of dental caries. All three patients were diabetics and the infecting organisms were either staphylococcal or streptococcal. Since these organisms originate from skin as well as the oropharynx, the actual source cannot be identified with confidence. The authors concluded that prophylactic antibiotics administered prior to the dental manipulations could have diminished the threat of prosthesis infection.[71] Kabalin and Kessler[68] described two cases of penile prosthesis infection in which dental procedures were performed either one or

three weeks prior to hospitalization. No organism was identified in either case, yet the authors concluded that all penile prosthesis patients should be premedicated prior to invasive dental procedures.[68]

In a survey of 297 responding urologists in the United States,[70 58] percent felt that dental bacteremias posed very slight risk of infecting the healed penile prosthesis. The majority (57 percent) of urologists surveyed did not recommend antibiotic prophylaxis prior to invasive dental procedures. None of the respondents reported experience with penile prosthesis infections related to dental bacteremia.

Despite the fact that dental bacteremias have been implicated but not proven as a source in only five penile prosthesis infection cases, some authors recommend antibiotic prophylaxis prior to dental procedures.[67,68,71,72] Because hematogenous penile prosthesis infections are so rare, it is probably most appropriate not to prescribe antibiotic prophylaxis. If a particular patient is significantly immunocompromised or at higher risk due to chronic infections, antibiotic prophylaxis may be justifiable after consultation with the patient's primary care physician. Elective dental treatment should be deferred until the penile prosthesis incisions are healed, which may take up to three months.

Conclusion

Dentists and physicians alike are confused and conflicted about antibiotic prophylaxis of patients for whom no published guidelines are available. A close examination of data on all six types of implants or devices reviewed in this article points toward a common scenario. A limited number of case reports that temporally associate dental treatment with implant infection are put forth as evidence of high enough infection risk to justify routine prophylaxis. Bacteriologic confirmation is either debatable or absent, and no prospective trials are available or forthcoming due to risks and liability.

Concern with the high morbidity and mortality associated with all six implant and device infections seems to supercede rational consideration of risk vs. benefit. How can dentists make rational clinical judgments about antibiotic prophylaxis given these difficult circumstances? An awareness of published data along with constructive physician consultation based on these data is a prudent way to formulate patient management strategies. Patient education should be aimed at reducing chronic bacteremia by maintaining excellent oral health and immediate reporting of symptoms indicative of acute infections of the head and neck.

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Million Dentist March

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Organized dentistry has never enjoyed the political clout of, say, the National Rifle Association, the Subsidized Tobacco Growers Institute or the Federation of Marmoset Breeders. That's why Congress has left us to the mercy of the FDA, the FTC and the designers of the Yellow Pages. Rodney Dangerfield commands more respectful attention. This dolorous picture is about to change.

It should be apparent that if we are to front more than a tepid denouement to managed care, pierced tongues, smokeless tobacco and ignored recall cards, we will be forced to mount vigorous campaigns on a national level. Charlton Heston's dentist should be able to help us here.

Noting the recent successes of the Million Man March, the Million Mom March, the Million Gay and Lesbian Alliance March and the Million People With Nothing Better to Do March, it would seem the phrase "take a hike" might take on new meaning for us.

The Million Dentist March has a nice ring to it. Unfortunately, it is somewhat diminished by the fact that there are only about 100,000 of us. What with so many out playing golf and attending to important issues like learning to market cosmetic dentistry, we would be sorely beset to assemble a fraction of even that number. Somehow The Seventeen Hundred and Fifty Dentist March lacks the formidable punch of a million irate moms, even though fewer than 500,000 actually showed up.

No matter, perhaps there were fewer than a million of them, but the composite picture of that many females -- ranging from the sweet little ladies from Pasadena to odious Gorgons in brown bombazine and disturbing amalgams of elf, kitten and bacchante -- was a scene to be reckoned with.

In getting our own protest off the ground, it should be made clear to recruits that the term "march" is only a euphemism. Dentists, who enjoy a sedentary life bent over supine bodies, are not much into actual marching. We would, however, be amenable to golf carts or operating stools, providing the casters tracked properly.

The important thing here is the picket signs and banners that are an obligatory feature of any gathering on Capitol Mall. They must be waved about vigorously enough to attract media attention, yet not so manically as to defy attempts to read their message. Inasmuch as the fiery rhetoric that is an integral part of the March protocol is purposely designed for style, not substance, the message on the signs is the only clue the TV viewing public will get regarding the purpose of the March.

Here is where we encounter a major problem, one that threatens the whole essence of the project. Dentistry, being one of the last bastions of individuality, is composed of quirky people who have trouble presenting a united consensus on almost any subject. For the Million (More or Less) Dentist March to be anything more than a dizzying goulash of opposing concepts, we are going to have to accept some compromises. We definitely don't want Wolf Blitzer summarizing our appearance as "ain't nobody here 'cep' us riffraff."

It won't do to have an incandescent mob of professionals on one side brandishing signs advocating mandatory fluoridation, while opposite them is another bunch denouncing poisoning the water supply. The anti-amalgam gang can't be castigating the mercury-is-OK group with inflammatory objurgations. Unrestricted, the States' Rights people will be at the Reciprocity adherents' jugulars, and first thing you know the National Guard is mobilized with big black dogs and water cannons to restore the peace.

On the upside, we may briefly grab the attention of Congress (providing any of the esteemed members are actually present in Washington) but not in the positive way we envision.

So, obviously, we need to get some unanimity of purpose. How about tongue piercing, are we all agreed on that? No? Violation of individuals' rights to do what they wish with their personal parts. OK, how about chewing tobacco? Then we'd have not only the tobacco consortium down on us, but also the National and American leagues combined.

Well, look -- we've got the lathes and the cardboard and the marking pens. Why don't we sit on this march idea awhile, say until the biofilm flap dies down. Meanwhile we try to rustle up another 900,000 dentists of a single mind. It would look better on the tube.