

In Praise of What We Do

Is there a better profession than dentistry? I don't think so.

I RECENTLY HEARD a news report concerning a poll taken of physicians that measured their satisfaction with their career choice. I was astonished by the results of the poll. It appears a significant number of physicians were not happy with their choice of career and, if given the opportunity, would have pursued some other endeavor.

I did some online research to see if I could find the study to which the reporter was referring. I found two. The first concerned physician career satisfaction across specialties, but was from July 2002. The second concerned the career satisfaction of recent graduates from family medicine residencies. This one was published in July 2008. I don't think either article was the one referred to in the news item. However, reading them was instructive.

All of this led me to consider the career I had chosen—dentistry. I have been very happy with dentistry, and orthodontics. I still find myself anxious to get to work each day, to see the patients under my care and to help them out. Each day is a challenge, but one that keeps me thinking and involved. I have spoken with many dentists over the years; most feel the same way.

What makes dentistry different from medicine? The way we interact with our patients is one important difference. Who hasn't gone to a physician's office for an appointment at 10 a.m. and not been seen until 11:30 or 12? Wait times in physicians' offices are legendary. Most dental offices, on the other hand, seat their patients almost as soon as they walk in the door. It seems rare, at least around Buffalo, that you have to wait long for your dental appointment.

Another difference is that the government seems to be less involved in dentistry than in medicine, even without national medical insurance. While I understand the government continues to make inroads into our practices, we remain much less regulated than our colleagues in medicine. Sure, we have HIPPA and OSHA, but these seem to be minor annoyances compared to what physicians must deal with.

This is a wonderful time to be a dentist, too. With all the advances in treatment options, we are able to offer our patients truly unique care for their teeth. When I went to dental school, all those many years ago, I heard that the "Golden Age" of dentistry had passed, that it had occurred and ended in the '50's and '60's. I challenge that notion. It seems to me we are now in the "Golden Age" of dentistry. With all the technological advances being made each year, we can provide our patients with some miraculous treatments.

Implants, for example, allow us to replace missing teeth with something that functions like natural teeth. Advances in laser surgery enable us to give our patients much more predictable and more esthetic outcomes. Advances in porcelain science provide us with veneers, which match the existing teeth exquisitely. In patients who are completely edentulous, implant-supported prostheses restore the patient to an occlusion that is much more stable and functional. All these advances mean our patients have more and better treatment options than ever before.

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Patients appreciate these better options, too. We can make their smiles dazzling, helping them to feel better about themselves psychologically. As an orthodontist, I see this every day. Patients come to me for treatment with teeth crooked, crowded and misaligned. Over treatment, as their teeth align and begin to look better, you see changes occurring in the patients. They become more self-confident. They appear happier. When the day arrives to remove the braces, the patients are universally excited and pleased. There is no better feeling than seeing the smile of appreciation on patients' faces when I remove their braces and they see themselves for the first time with straight teeth.

Further proof of the growing popularity of dentistry are reports that dental school applications are up across the country. For the 2006-2007 academic year, there were 2.54 applicants per slot. In 2001-2002, there were 1.64 applicants per slot. And the profession is attracting a better class of student. As the numbers of applicants increase, the competition for spaces in dental classes increases. This leads to students who have better GPAs being accepted into dental school. This can only help the profession in the years to come.

I believe organized dentistry has played an important role in all of this. Without our associations arguing our case before the legislatures of the country, our profession could be as over-regulated as medicine. Here in New York State, we have a strong voice in the State Legislature, thanks to NYSDA and EDPAC. Legislators listen to our opinions carefully. We get positive action on things because we are respected by those in power. We must continue to be active on the legislative level.

Maybe I'm lucky, but I don't think it's that. Dentistry is a wonderful profession, and I am proud to a part of it. I can honestly say I have never regretted choosing dentistry for my life's work, as it has enabled me to help many people, to make their lives better, and to take satisfaction in all that I do. It has helped me become a better person, too. I can't imagine another profession that would be as enjoyable and rewarding.

 D.D.S.



New York State Dental Foundation Looks Back on Year of Service

Children have been important beneficiaries of efforts to improve oral health and profession's image.

Laura Beth Leon

SINCE ITS ESTABLISHMENT in 1980, the New York State Dental Foundation has supported efforts aimed at improving the oral health of all New York State residents. It has also devoted resources to promoting the dental profession and its practitioners. In looking back at the foundation's considerable accomplishments in these areas, by far, the most exciting initiative the foundation has embarked upon in just the past year is the promotion of the children's dental health certification project.

Working in concert with the New York State departments of Health and Education, and the Bureau of Dental Health, the foundation is striving to make sure that all public schools, school administrators and nurses understand the new law, which requires that school districts request a dental health certificate from children in grades K, 2, 4, 7 and 10. These certificates are an important first step in identifying children who present with serious oral conditions that impact their ability to chew, speak or focus on school activities. The foundation is also working with component dental societies and other organizations to develop a network of "dental homes" for children with no or limited access to dental care.

The foundation recognizes how important it is for the dental profession's image in New York State that organized dentistry be seen as a leader in securing passage of the dental health certificate legislation, ensuring that the legislation is implemented successfully and advocating for public participation.



Youngster expresses pleasure with treatment he received at Give Kids A Smile screening event at Farmingdale College School of Dental Hygiene, Suffolk County.

This effort has been helped immeasurably by the generous support of the ADA, which awarded the NYSDF a grant to support its public advocacy efforts in this area. The grant made it possible for the foundation to hire Milton Lawney, D.D.S., as public advocacy coordinator. Dr. Lawney, former executive secretary of the New York State Board for Dentistry, is working with NYSDA components to alert the public and the dental community to the need for oral health screenings.

The foundation also hired two part-time regional coordinators. Jeffrey Seiver, D.D.S., oversees, develops and promotes screening efforts on Long Island, while Amy Pozzi, Fifth District Executive Director, focuses on Central and Western New York State. In recent months, Ms. Pozzi reached out to Kinney Drug Stores, which

agreed to use its 31 upstate stores to "house" children's dental health assessments on a Saturday in early February. Five hundred seventy-four children from 19 counties in the upstate area were assessed in one day, with the help of over 90 volunteer dentists.

Meanwhile, Dr. Seiver participated in screenings for more than 1,000 children at three institutions in Suffolk County: Farmingdale College School of Dental Hygiene, St. Charles Hospital and Stony Brook University College of Dental Medicine. (Fluoride varnishes, sealants and emergent care were also provided.) Children who needed follow-up care were seen, pro bono, by a volunteer dentist who participates in Suffolk County's Save-A-Smile program. The

Foundation will look to programs such as Save-A-Smile or California's Adopt-A-Kid as it seeks grants to fund follow-up care throughout the state.

Both events were important, not just because they served children in need, but because they were testing grounds for future screening events. It must be stressed that many components already do mass children's dental health assessments. Nassau County Dental Society, for instance, just held its sixth enormously successful Give Kids A Smile Day event, at which thousands of children were seen by a dentist. It is the foundation's goal to identify these efforts and, when possible, help strengthen and promote them. Already, the foundation has instituted a new program that funds qualified dental screening programs based on the number of assessments completed. Through this program, both Nassau and Suffolk counties received \$1,500 to help support their GKAS event.

In a related development, the New York State Dental Foundation Board has voted to award up to five Give Kids a Smile Awards in 2009. Each award is worth \$5,000. All nominations must come from a NYSDA member or be accompanied by a letter of support from a NYSDA member. As in the past two years that the awards have been presented, every effort will be made to coordinate awards ceremonies with the components that "house" a GKAS Award winner. This spring, the Board of Trustees will consider which of nearly 20 applications received for the 2009 prize will earn the foundation's recognition.

Lifeline to Troubled Professionals

Beginning this year, the New York State Dental Foundation is administering the Dr. Thomas Sullivan Chemical Dependency Grant Program, to provide financial assistance to chemically dependent individuals who require in-patient medical treatment. The grants are designed to assist in the payment of initial treatment costs.

NYSDA has contracted with the NYSDF, as its charitable subsidiary, to administer the program and has donated \$15,000 to establish the program. Grant applications will be screened by the NYSDA Council on Chemical Dependency, whose chair will communicate to the foundation a recommendation to approve or reject the application. The foundation will be given final approval on the application. The program is open to all dentists in New York State and should prove to be an important lifeline to affected individuals.

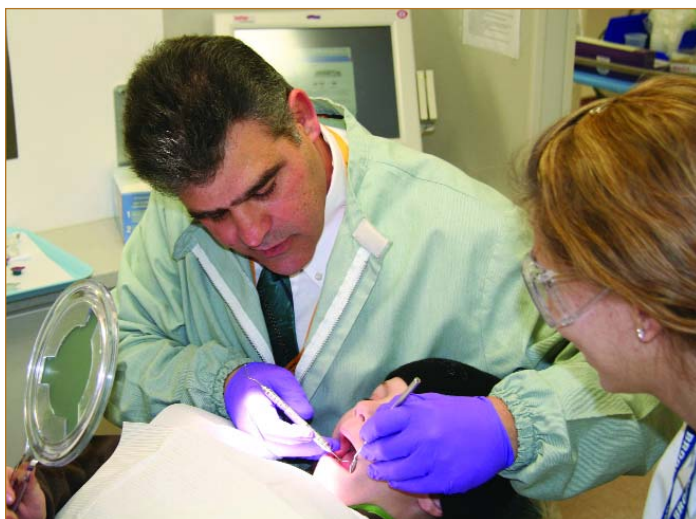
The foundation is currently developing an online course on chemical dependency. It plans to donate 50 percent of the income it receives from that course to support the Dr. Thomas Sullivan Chemical Dependency Grant Program. More information about the grant program can be obtained at the foundation Web site, www.nysdentalfoundation.org. An article about it appeared in the February issue of the NYSDA News.

Web Learning

The Dental Foundation is broadening its offerings of online continuing education courses with two new additions, both of which



Volunteers from Nassau County Dental Society screen children amid airplanes at Cradle of Aviation Museum in Garden City, Long Island.



Suffolk County Dental Society Treasurer Nick Vittoria examines child at GKAS screening event at Stony Brook University College of Dental Medicine.

are being offered free of charge to NYSDA members, in recognition of the substantial monetary support that NYSDA has provided to the foundation. One, available now, is a series on licensure and regulatory issues, written by Dr. Lawney. The other, due this spring, will focus on obesity and oral health care, and has been provided to the foundation by the New York State Foundation for Healthy Living.

Activity on the foundation Web site has increased by 58.65 percent since the site was launched last May. At the same time, there has been a 64.82 percent increase in the number of individuals using the site to take courses online.

The foundation's ethics and jurisprudence course has been presented in several components, as well as online. Every effort has been made to ensure that the course, which is approved by the Department of Education as meeting the state-regulated man-

date, includes compelling real-life case studies and references to the NYSDA Code of Ethics. NYSDA President Michael Breault and General Counsel Lance Plunkett have been particularly helpful in working with the foundation to improve the content of the course.

HIV/AIDS Outreach - Year Two

The foundation will sponsor a conference on oral pathology in October that will explore topics important to the overall health care of patients, among them, smoking cessation, HIV/AIDS, oral cancer, and bioterrorism and the role of the dental professional. The conference is being organized by the foundation in cooperation with the NY/NJ AIDS Education and Training Center, the United States Department of Veterans Affairs/Stratton Medical Center, HIVdent and the AIDS Council of Northeastern New York. It is a follow-up to a first-ever "Summit on Oral Health Care, HIV and AIDS" that the foundation sponsored last October. Nearly 200 people attended the event, which was held in New York City.



Young audience responds enthusiastically to oral health care message delivered at GKAS event at Cradle of Aviation Museum.

Elder Oral Health Care

The New York State Dental Foundation is dedicated to improving access to oral health care for underserved, vulnerable and at-risk populations. Many of New York State's elderly are among those in need. Two years ago, the foundation sponsored its first-ever "Elders Oral Health Summit." It is preparing now for a follow-up presentation on May 29. The foundation is partnering with Columbia University College of Dental Medicine to present a daylong symposium on elder oral health care. Health care providers from across the medical spectrum have been invited to participate.

New York State Fair

Last year, the Foundation strengthened its collaborative partnership with the Fifth District Dental Society at the New York State Fair. Volunteer dentists and dental hygienists performed oral cancer screenings and oral health assessments on more than 500 children, adults and seniors over the course of three days. Other partners who pitched in to assist with this worthy project were the New York State Oral Health Coalition, Henry Schein, Delta Dental, United Concordia, Benco Dental, Patterson Dental, Opportunities for Otsego, Rochester Primary Care Network, Crest/Oral B, Orajel/Del Laboratories and CVS Pharmacy/Caremark.

It was an overwhelmingly positive, if exhausting, experience that the foundation hopes to build upon this year.

Promoting Community Service

In an effort aimed at increasing the ranks of health care providers willing to donate their time to treat needy patients, last year, the Foundation began a pilot program to underwrite the cost of the MLMIC malpractice policies of up to 10 dentists who volunteer at Harvest House Ministry Center in Buffalo, Health Ministries of the Southern Tier in Corning and St. Joseph's Neighborhood Center in Rochester.

Dentists who are eligible for this program must furnish up to 10 hours a week to a specified organization on a pro bono basis.

Looking Forward

At the beginning of this year, the Dental Foundation expanded its Board of Trustees by three. Named to the new slots were Paul Leary of Suffolk County and James Sconzo of the Second District. NYSDA President Mike Breault will serve as special liaison to NYSDA. The Board plans to meet four times this year: March 6; May 15; late August, via conference call; and October 23.

Information about the foundation, its programming and services is constantly being updated on the foundation Web site, www.nysdentalfoundation.org. ■

Ms. Leon is executive director of the New York State Dental Foundation.



Nassau County Editor Robert Kelsch, left, receives Bernard P. Tillis Award from NYSDA President Mike Breault. Dr. Kelsch was cited for excellence in dental writing.

COUNCIL SELECTS ROBERT KELSCH TO RECEIVE TILLIS AWARD

Thomas Bonomo and Chester Gary Cited for Honorable Mentions

ROBERT D. KELSCH, D.M.D., editor of the Bulletin of the Nassau County Dental Society, is winner of the 2008 Bernard P. Tillis Award for excellence in dental writing.

Dr. Kelsch was selected to receive the award, presented by the NYSDA Council on Membership and Communications, for his untitled editorial in the July/August 2008 NCDS Bulletin. In his editorial, Dr. Kelsch lamented the impediments dental providers encounter when trying to treat disadvantaged patients using governmental programs. He received an inscribed plaque.

The Council on Membership and Communications also selected Suffolk County Co-Editor Thomas Bonomo, D.D.S., and Eighth District Editor Chester J. Gary, D.D.S., J.D., for Honorable Mention citations. Dr. Bonomo was recognized for his editorial "Dentist or

Non-Dentist, a Tough Decision" in the October 2007 SCDS Bulletin. Dr. Gary's award was presented for his editorial "If Your Conscience Could Talk," which appeared in the Holiday 2007 8th District Bulletin. Dr. Bonomo, of Northport, on Long Island, is a retired life member. Dr. Gary is a general practitioner in Depew, near Buffalo.

The Tillis Award was established in 1996 to honor the memory of the longtime *New York State Dental Journal* editor. It recognizes members of the Dental Association who, through their writing in *The NYSDJ* or in any component publication, promotes a positive image of organized dentistry.

Dr. Kelsch, a 1992 graduate of the University of Connecticut School of Dental Medicine, is an oral pathologist in Rockville Center, on Long Island. His winning editorial is reproduced here.



From the Editor's Desk

Bernard P. Tillis Award-Winning Editorial

Robert D. Kelsch, D.M.D.

ACCESS (OR LACK THEREOF) to dental care continues to be one of the most vexing issues confronting our profession. The topic is forefront in our profession's national agenda; it headlines symposia; and it reaches the general public's knowledge when horrifying cases like that of Diamonte Driver are in the headlines and on the daily news. We are all appalled when cases like that come to pass, and I applaud the ADA's advocacy for access, but I speak for myself and I'm sure for others, when I say I feel powerless sometimes on how to go about addressing this burgeoning need for dental care, particularly in the low-income population on a day-to-day basis.

Certainly access is not an issue for us or most of our patient populations here on affluent Long Island. But working as I do full time in a hospital setting, I have seen many cases that while not to the extent and severity of Diamonte, are significant in their own right. Most of us, whether private practitioners or hospital based, work hard at trying to provide care for those less fortunate than ourselves, by donating our time at clinics, offering uncompensated care in our offices or participating in organizations and volunteering at events such as Give Kids A Smile. However, I think we can all agree that there is much more needed, and here is where the difficulty begins. As our own Mark Feldman notes, "Volunteerism isn't a health care system... never will be."

Now, there are ample dentists on Long Island and in New York State who would be more than willing to provide well-needed dental services to those less fortunate; however, they feel the burden of dealing with governmental agencies such as the Center for Medicare and Medicaid Services, Medicaid Department, precludes them from doing so—this despite the highly touted significant increase in reimbursement levels recently (due in large part to the diligent efforts of committed dentists and individuals and their legal suit).

So if dental reimbursement levels are better (likely not to our fee-for-service level, but workable), why don't we have a surge of dentists participating in these programs? On speaking with colleagues on this issue, I am overwhelmingly convinced that it certainly is not a mentality of not wanting to provide these services, but, rather, how to go about becoming a provider, and once that's accomplished, assuring that reimbursement is received so we can afford to continue to provide services. Both of these issues I can tell you from personal experience are not insignificant obstacles.

As a hospital-based oral pathologist with a biopsy service and patient care duties within, you would think that my being a Medicaid provider would be a matter of course. Well, wouldn't it be interesting to know that my application for Medicaid provider status has been ongoing and delayed for four years! To date, my most recent inquiry to the Medicaid Division was met with a, "We need to review your file and you'll receive a response in 90 days." And if this is happening to me, how long do you think a private practitioner would wait before throwing his/her hands up and deciding this type of delay and paperwork is too much of an obstacle? Here I am, as most of us are, willing to provide an invaluable service to those less fortunate, and I'm met with a typical bureaucratic response.

And should I eventually be allowed the privilege of becoming a Medicaid provider, how easy will it be to submit for reimbursement and receive payment? Well let me refer to the 61-page billing guideline manual. And should I surpass this hurdle after having to hire a dedicated full-time staff person to understand the complexities and perform my Medicaid billing, what next? How about a new New York State law that requires all Medicaid providers to have a detailed compliance program or worry that they might be sued for Medicaid fraud after an audit? And all these stipulations and requirements are supposed to make access to care for those less fortunate ultimately more attainable? I fail to see the logic.

I'm not saying there should be unfettered and unregulated practice; however, if we assume that the individuals currently with access to care issues are often the same persons on public assistance, such as Medicaid, and we continue to create such seemingly insurmountable barriers to those professionals willing to provide services or delay the processing of their applications, thus, preventing them from doing such, we will, by default, still have access issues for these patients despite any reimbursement levels.

To me, what is probably one of the most incongruous parts of this situation is that we dentists, who pay state income taxes—of which, Medicaid accounts for approximately 45% of the New York State budget—because of the bureaucracy and issues highlighted above, are unable to provide services for those patients for which our tax dollars are specifically devoted. This is all very confusing to me. If someone has an answer, please let me know.

Understanding New York's Medicaid Program

Shining a light on a complicated and, at times, frustrating system.

Judith L. Shub, Ph.D.

FOR OVER A DECADE, New York State has operated two, distinct dental Medicaid programs. This is a source of confusion for dentists and patients. Commonly, the programs are referred to as the “fee-for-service” and “managed care” programs. These are misnomers. Both are managed care plans, and most dentists who participate in Medicaid are reimbursed on a fee-for-service basis. Where they do differ is that the fee-for-service program is administered directly by the State Department of Health through its subsidiary Computer Sciences Corporation (CSC). Claims are paid to providers by the Department of Health. Patients in this program can seek care from any dentist who is a Medicaid provider.

The managed care program enrolls patients in HMOs (health maintenance organizations). HMOs are a form of integrated group practice with two distinct aspects. First, they share many of the same privileges as other forms of integrated professional practices, that is, the PC and the LLC. They are regulated by the New York State Health Department and they have responsibilities for the provision of health care. Second, they perform the function of third-party payers. They are a type of health care benefit plan that assumes risk for the health care costs of enrollees.

Dentists enrolled in managed care plans may not receive the same reimbursement as those in the fee-for-service program. Instead, their reimbursement is based on the fee schedule and reimbursement policies agreed to contractually by each individual dentist and the managed care plan. A key distinction between the two programs is that DOH, as the administrator, establishes fees and policies for the traditional fee-for-service program. The department does not play a direct role in fee setting or detailed pro-

gram oversight for the HMO-based program. For DOH, this is one of the benefits of contracting with HMOs to manage the delivery of Medicaid services.

Patients who are not enrolled in managed care plans, or are enrolled in managed care plans that do not provide dental treatment, continue to see Medicaid participating dentists. These dentists are reimbursed by CSC under the auspices of the original “fee-for-service” program administered by DOH.

Why Managed Care?

Some people have suggested that New York State is enrolling Medicaid recipients in HMOs in response to dental fee increases won as a result of legal action taken by NYSDA against New York State in 1998. This is erroneous. The incentive to move Medicaid recipients into HMOs is driven primarily by spiraling medical costs and concerns about access to and quality of care unrelated to the dental program.

In the mid-1990s, New York State applied for a federal waiver to permit the enrollment of its Medicaid recipients in HMOs. The rationale was two-fold. Medicaid recipients had difficulty obtaining basic medical services, and they overused costly, emergency room treatment. New York State's government also had tremendous fiscal concerns given the scope of the program and related financial obligations. DOH hoped that HMOs, with their perceived emphasis on preventive care, access to care, integrated scope of available services and quality, would serve as a mechanism to improve patient access to appropriate medical treatment and improve the overall health of Medicaid recipients.

DOH views HMOs as a mechanism to help control spiraling health care costs by containing the state's fiscal liability. For example, if the state budgets \$505 million in a fiscal year for Medicaid dental treatment and claims totaling \$650 million are submitted, DOH must reimburse those claims. In contracting with an HMO, DOH limits its financial liability by fixing its costs for medical and dental care. DOH reimburses the HMO on a negotiated capitation basis, and the HMO bears risk for any potential cost overruns. The HMO, in turn, negotiates reimbursement rates with its contracted providers.

With the granting of the federal waiver, New York State began contracting with HMOs to provide medical care to its Medicaid population. The HMOs, in fulfillment of their contracts with New York State, began enrolling Medicaid recipients. If an individual HMO offers dental treatment, patients enrolling in the HMO must receive both their medical and dental treatment through the HMO's providers.

Managed Care and Dentistry

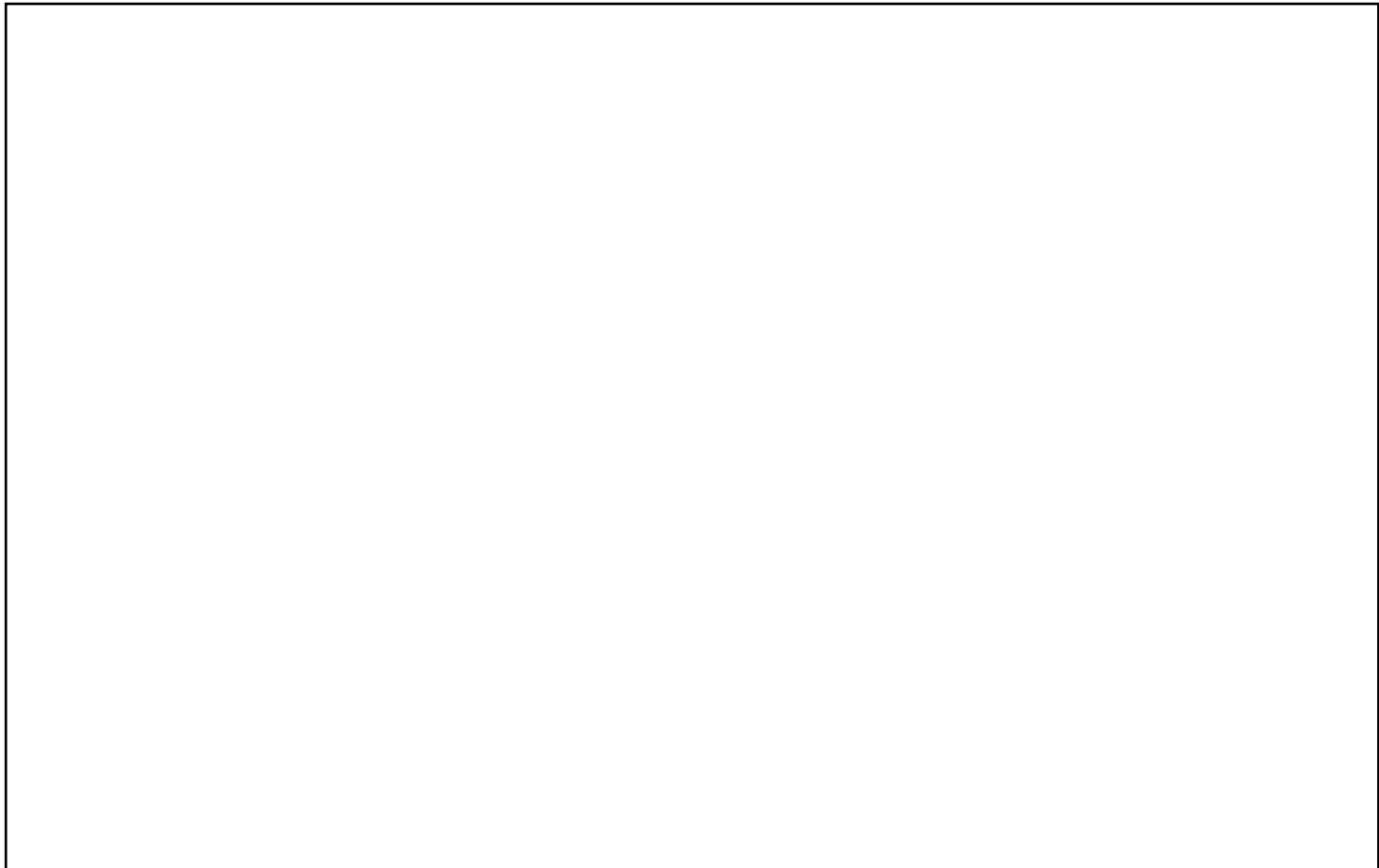
HMOs are multidisciplinary, providing comprehensive health care coverage for virtually all aspects of medical care and hospitalization. An HMO may contract with or hire its health care providers individually and/or contract with other integrated group practices

for particular services. Usually, HMOs that offer dental treatment do so through contracts with IPAs (independent practice associations). An IPA, in turn, contracts with individual dentists.

Although HMOs primarily reimburse professional providers on a capitation basis (that is, a specific amount per patient per month), most dental managed care companies continue to reimburse contracting dentists on a fee-for service basis.

With respect to reimbursement, the fees offered by an individual managed care plan are not necessarily related to the established DOH Medicaid fee schedule. The fees paid by managed care companies are usually lower. When a plan offers a contract to a doctor, the plan and the doctor then are negotiating the elements of the contract, including the fees.

Since managed care plans seek to reduce their costs, it is likely that a plan would offer its contractors the lowest fees it believes they will accept. If the fees offered are insufficient to attract the desired number of participating dentists, the plan would increase its offer. Similarly, the criteria for authorizing treatment services and approving claims differ from plan to plan. Therefore, the services allowed by each managed care plan will differ from each other and from the traditional program administered by CSC. Because a goal of the managed care program is to reduce service delivery and associated costs, there is no rationale for DOH to require that its



NYSDA as Advocate for Improved Oral Health Care

AS THE PROFESSIONAL ASSOCIATION for dentistry in New York, the New York State Dental Association continually advocates for oral health and access to dental treatment. To this end, the Association has been a strong supporter of New York State's publicly funded programs since their inception over 40 years ago. As a result, the Medicaid program in New York State offers the widest range of services to covered patients in the nation, as well as the highest dental fee schedule. And New York State covers all necessary dental treatment for over four million Medicaid-eligible recipients, in addition to those covered by New York's SCHIP and FHP programs.

NYSDA's current policies and legislative efforts to help its members deal with the managed care arena include two proposals, which it hopes to present to the State Legislature. They are:

- A bill requiring that managed care dental plans utilize at least 80% of the funding dedicated for dental treatment on dental treatment.
- A bill requiring that the Department of Health approve rates for Medicaid managed care plans. At the present time, DOH does not play any role in rate-setting, leaving the determination of rates to the marketplace.

Medicaid Subcommittee

The Council on Dental Benefit Programs is the primary body responsible for addressing Medicaid-related issues. Appropriate executive staff is responsible for supporting and guiding council activities and implementing NYSDA policy.

Because of the complexity of the issues before it, the council has authorized and created several subcommittees as needed to address specific issues, including a subcommittee established in 2005. This group includes members with expertise in dental benefit program issues, managed care, Medicaid and government programs.

This year, the subcommittee's membership was broadened and to include the current and former chairs of the Council on Dental Benefit Programs, NYSDA's current and former representatives to the ADA Council on Dental Benefit Programs, and members with knowledge of and who participate in the Medicaid program in the New York metropolitan area.

To be effective, this group must understand the complexities of the program in the context of the dental benefit industry and political realities. The primary charge to this committee is to develop recommendations for effective responses to the managed care program, including the impact of a carve-out of dentistry from the HMO program.

In comparison to other states, New York has effectively maintained more traditional benefit plans, particularly in dentistry.

contractors utilize the same fee schedules and protocols traditionally in place.

While, theoretically, managed care may appear to be a cost-effective mechanism to deliver health care, there are several factors that make it a poor fit for dental services. Managed care plans are designed to control expenditures by reducing both the cost of treatment services and the amount of unnecessary treatment provided. They do so by negotiating reduced fees with health care providers and by establishing financial disincentives to reduce unnecessary or excessive treatment. Such strategies are not effective for dentistry for a number of reasons, including the following:

- The Medicaid population characteristically exhibits a great amount of untreated dental disease and under-utilization.
- There is an unequal "playing field" – dentists lack the knowledge and resources to negotiate favorable contracts with managed care companies.
- Dental practices generally have higher operating overhead than do medical practices.

More Medicaid dental providers have contracted with IPAs in the New York metropolitan area and Westchester County. DOH has had less success providing Medicaid dental treatment through its HMOs in other regions of the state. There are fewer dentists and lower dentist-to-patient ratios in these areas, enabling dentists to reject offers with managed care plans or to negotiate more favorable fees and terms in their contracts with such plans.

NYSDA Weighs In

Today, the managed care arena extends well beyond New York State's public health insurance programs into the private sector. In comparison to other states, New York has effectively maintained more traditional benefit plans, particularly in dentistry. However, with a declining economy having an impact on dental practices statewide, more dentists are considering contracts with managed care plans in hopes of increasing patient flow and establishing a steady, albeit discounted, revenue stream.

Federal and state anti-trust laws place serious limitations on the role a professional association can play in the contracting process. Similar restrictions prohibit doctors from negotiating jointly and discussing fees among competing practitioners.

One of the most difficult challenges faced in working with Medicaid issues is dealing with the understandable frustration and impatience of many members. NYSDA does not advise doctors to simply refrain from signing contracts with managed care plans, pointing out that to do so would be irresponsible as well as illegal. For some practices, such contracts can be a good business decision;

for others, disastrous. The decision must be made by the individual doctor based upon the nature of his or her practice, objectives and overhead considerations.

NYSDA does provide services to assist its members understand and deal with changes in the dental benefits marketplace. Specific services NYSDA offers to its members include the following:

- Contract Analysis Service
- Legal Services Panel
- One-on-one personal assistance
- Courses on managed care and contracting

Examples of NYSDA's success in resolving managed care-related issues include its response to complaints from a number of members about an IPA that was terminating participation agreements with contracting dentists. A managed care plan can usually terminate a provider contract at will. However, as complaints came in, it appeared that the IPA was removing most of the participating dentists from its panel, raising questions about how such a strategy would impact patient access to care. Presumably, reducing the panel size would curtail utilization and increase the company's profits. NYSDA provided information to DOH, underscoring DOH's stated concerns about having enough dentists in the program. As a result, the IPA restored its original participating provider panel.

In many instances, NYSDA's responses are limited with respect to provider contracts since contracts are private business arrangements between individual doctors and managed care corporations. Nevertheless, the Association responds to dentist complaints by providing information to help affected members within the confines of anti-trust restrictions. NYSDA communicates directly with dental managed care companies about problematic policies as well.

From time to time, NYSDA receives non-specific complaints alleging that "other dentists are not providing proper treatment"; "patients aren't being seen"; "patients cannot access their assigned providers"; or "a plan is reducing a dentist's fees." It would be irresponsible for NYSDA to take action in response to any unsubstantiated contention. But when the complaint is supported by concrete evidence, the Association readily responds.

Given the scope of New York's Medicaid program, DOH is not focusing its resources on the dental program. For now, as long as its managed care contractors have dental panels and report patient contacts, the department does not view the managed care program as problematic. If data emerge that demonstrate that these contractors have failed to deliver oral health care, such data would be incorporated in any justification of a dental program carve-out. ■

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Dentistry in Time of Recession

H. Barry Waldman, D.D.S., M.P.H., Ph.D.; Ramiz A. Chaudhry, D.D.S.; Debra A. Cinotti, D.D.S.

Abstract

The economics of dentistry during a recession can be difficult. The particular concerns raised in this period of economic uncertainty are considered from the perspectives of earlier recessions and the system for payments of dental services. The eventual turnaround in the economy and a favorable future for dental practice are emphasized.

IN NOVEMBER 2008, the U.S. lost over a half-million jobs, the largest one-month drop in employment in 34 years.¹ This was followed by a loss of 524,000 jobs in December, bringing the total drop for last year to 2.589 million, just shy of the 2.75 million decline at the end of World War II. The Labor Department reported that the unemployment rate climbed to 7.2%, the highest level in almost 16 years.²

A recession is a significant decline in economic activity, often reported as lasting at least two calendar quarters of negative gross domestic product (GDP). A recession begins just after the economy reaches a peak of activity and ends as the economy reaches its trough. "Expansion is the normal state of the economy; most recessions are brief, and they have been rare in recent decades."³ From 1945-2007, the National Board of Economic Research (NBER) has identified 11 recessions; their average duration was 10 months (peak to trough).⁴

It is during these recessions, when workers lose their jobs, that most workers also lose the health insurance that covers them and their families. The loss of income and health coverage associated with rising unemployment causes more families to turn to safety-net programs like Medicaid and the State Children's Health Insurance Program (SCHIP) for health coverage.¹ The Medicaid

program provides health coverage and long-term support to 44.5 million in low-income families and nearly 14 million elderly and people with disabilities.⁵

Many of the families recently seeking safety-net programs had a secure workforce attachment, steady income and health coverage until they lost their jobs in the recession. Most people who lose their jobs cannot afford the premiums to extend their employer-based coverage through the Consolidated Omnibus Budget Reconciliation Act (COBRA).

COBRA gives workers and their families who lose their health benefits the right to continue health benefits provided by their group health plan for limited periods of time under certain circumstances, such as voluntary or involuntary job loss, reduction in hours worked and transition between jobs. Qualified individuals may be required to pay the entire premium for coverage up to 102% of the cost to the plan.⁶ "Families report that lacking coverage has serious adverse consequences for their already strained finances and deters them from obtaining health care because they cannot afford it."¹

Medicaid programs are feeling the strains of increased demand, while states have fewer resources available to support the program as revenues come in lower than projected. "Looking ahead to next fiscal year, the outlook is that FY 2010 almost certainly will be a very difficult year, with the potential for widespread cutbacks and provider rate cuts that will affect millions of Medicaid beneficiaries."⁷ (Note: The federal fiscal year is the accounting period of the federal government. It begins on October 1 and ends on September 30 of the next calendar year. Each fiscal year is identified by the calendar year in which it ends. For example, FY 2010 begins October 1, 2009, and ends September 30, 2010.⁸)

Paying for Dental Care

It wasn't even two years ago, in October 2007, when The New York Times headlined the front page article, "Boom Times for Dentists, But not for Teeth." This attention-grabber was followed by the subtitle, "For American Dentists, Times Have Never Been Better."⁹ The writer emphasized the fact that dentists' fees were rising faster than inflation. But, he reported, more than 100 million people lacked dental insurance and "the percentage of Americans with untreated cavities began rising this decade, reversing a half-century trend of improvement in dental health... Despite the rise in dental problems, state boards of dentists and the American Dental Association... have fought the effort to use dental hygienists and other non-dentists to provide basic care to people who do not have access to dentists."⁹

Post Recessions

In the years following the recessions of the early 1980s and 1990s, the annual growth of dental expenditures approximated or exceeded the annual growth of overall professional health services. However, in each of the four years after the last recession in 2001-2003 (2004, 2005, 2006, 2007), the average annual growth of dental expenditures was lowest among the annual growth of expenditures for all other professional health services (Table 1).

In addition, since 2000, the proportion of spending for all personal health care services represented by dental care decreased progressively, from 5.4% to 5.0%.¹⁰

Out-of-pocket Spending

Reliance on out-of-pocket spending for dental services was recently reported to far exceed comparable spending for all other health services. Expenditure for dental services in 2007 was \$95.2 billion, an increase from \$90.5 billion in the previous year. Further analyzing this amount, 44.2% of the 2007 spending for dental care was paid out-of-pocket, compared to out-of-pocket spending of 10.3% for physician and clinical services, 3.3% for hospital care, 26.8% of nursing home and 15.3% of overall personal health services. This significant difference in out-of-pocket spending has existed in the past and is projected to continue into the future (Table 2).

TABLE 1

Average Annual Growth in National Health Expenditures in Selected Health Services in Years Following Recessions in 1980s, 1990s, 2000s⁽¹⁰⁻¹²⁾

	1980-'82 Recession			1990-'91 Recession			2001-'03 Recession		
	1984	1985	1986	1993	1994	1995	2005	2006	2007
All Personal Health Care	11.7%	8.6%	8.8%	8.7%	5.5%	5.4%	6.9%	6.4%	6.2%
Physician Care	12.6	9.8	11.1	8.3	3.8	4.6	7.3	6.5	6.5
Dental Care	12.4	9.9	9.5	7.8	7.3	6.1	6.0	4.7	5.2

TABLE 2

Source of Payment for Selected Health Services: 1980-2011^(10,13)

	Dentist	Physician	Hospital	Nursing Homes	All Personal Health Services
Out-of-Pocket					
1980	66.3%	30.2%	5.2%	40.0%	27.1%
1990	48.5	19.3	4.4	37.5	22.5
2000	44.9	12.0	3.1	27.0	17.2
2007	44.2	10.3	3.3	26.8	15.3
2011*	42.9	10.9	2.6	16.4	23.2
Private Insurance					
1980	28.6	35.3	35.6	23.8	28.3
1990	48.5	43.0	38.3	33.4	33.4
2000	50.3	47.7	32.5	34.6	34.6
2007	49.2	49.3	36.8	36.2	36.2
2011*	49.6	47.3	32.6	34.9	34.9
Government Support					
1980	4.9	30.5	54.3	54.2	40.3
1990	2.9	30.6	53.2	49.2	39.0
2000	4.6	33.2	59.0	60.6	43.3
2007	6.4	33.6	55.1	62.1	45.3
2011*	7.3	34.6	59.8	64.0	44.4

* Projected

Private Insurance

In 2007, approximately half of dental and physician costs were covered by private insurance, compared to 36% for hospital, nursing home and all personal health services (Table 2).

Government Spending

Despite the fact that almost one-half of dental expenses are covered by private insurance, the costs of dental services are "felt" to a far greater extent because of the magnitude of out-of-pocket expenses, as compared to the "felt" costs for other health services. The difference is a reflection of the particularly limited government support for dental care. In 2007, combined federal, state and local government agency programs represented 6.4% of all dental expense, compared to one-third of physician services, more than half (55%) of hospital care costs, 62% of nursing home services and 45% of overall personal health services (Table 2).

What About Dentistry?

Consider the following statements, all of which appeared in *The New York State Dental Journal* in the past 20 years.

"The dental profession has weathered successfully the recession of the late 1970s and early 1980s." NYSDJ – 1986¹⁴

"The economics of dentistry during a recession can be difficult." NYSDJ – 1992¹⁵

"A review of Federal reports indicates that the dip in dental economics during the last recession, in the early 1990s, has been reversed. But large segments of the population continue to purchase dental care out-of-pocket." NYSDJ – 1996¹⁶

These prescient words reviewing dental economics in past recessions could describe the current economic downturn, especially the reference to the continued "purchase of dental care out-of-pocket." Equally important is the prophetic statement that "the dental profession has weathered successfully the recession."

But two significant concerns remain: 1. reliance on private health insurance at a time when many families will lose health insurance coverage as a consequence of the loss of employment; and 2. dependence on the Medicaid program for dental care.

In the best of times, Medicaid levels of reimbursement have been extremely limited. In addition, the high rates of patient no-shows in the covered population and Byzantine administrative procedures have frustrated practitioner participation. But, most important, many states fail to cover dental services for adults, except to eliminate pain and infection. The situation can only worsen as state governments seek to reduce mounting deficits during the recession.

In the short run, "elective" dental procedures (for example, esthetic procedures, replacements of the posterior dentition and "minor" orthodontic procedures) may be delayed and patients may settle for less expensive reparative and replacement procedures.

Are the halcyon days of dental practice past? Once again, words from a past recession would seem most fitting: "No industry or profession is completely recession-proof. Even those professions that are able to ride out a recession...experience difficult times in certain regions and communities, and dentistry is no exception."¹⁷

The reality is that the dental profession facing the current recession is very different from the profession and the population that confronted the economic reverses in past decades. The facts are:

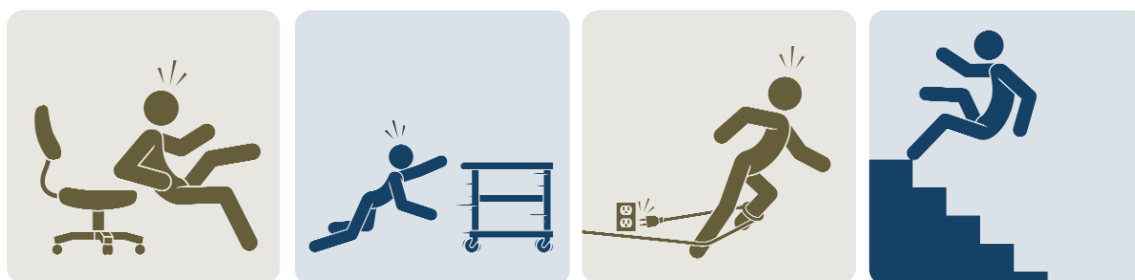
- A larger prevention-oriented population that has experience with third-party insurance coverage and has been demanding more dental services.
- The ability of the profession to provide services unimaginable in past decades (for example, digital radiography, implants, bonded restorations, computer-aided before-and-after simulations for case presentations, computer-processed crowns and a paperless record system).
- Dramatic decreases in the proportion of the population that is edentulous and that has been willing to invest in dental services to retain its remaining dentition, in particular, the geriatric population, which will increase to one-in-five residents in the coming decade.

Yes, there should be some concern that the growth in spending for dental services in the mid years of this decade has not kept pace with the rate of spending for other health services. Nevertheless, the reassuring words in a report from the American Dental Association, issued when the country faced the onset of the 1990-1991 recession, seem to fit the current economic downturn: "...because patient loads will increase over the long run, an economic recession should prove to be a minor interruption in improving practice conditions."¹⁸ ■

Queries about this article can be sent to Dr. Waldman at hwaldman@notes.cc.sunysb.edu.

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New York State Adopts New Fee Schedule and Regulations for No Fault and Workers' Compensation

Judith L. Shub, Ph.D.

ON MARCH 1, New York State adopted a new dental fee schedule and regulations for its no fault and workers' compensation programs. The new regulations contain a fee schedule for dental treatment performed on behalf of patients injured in workplace accidents. Previously, New York's workers' compensation program did not include a dental fee schedule. And the State Insurance Department historically adopted fee schedules compiled by the Workers' Compensation Board for the no fault insurance program. Prior to March, there had not been an increase in no fault fees since 1994, resulting in access problems for patients injured in motor vehicle accidents.

NYSDA representatives met with Workers' Compensation Board members to discuss the problems patients injured in work-related accidents were having obtaining dental treatment. In the absence of a dental fee schedule, practitioners had to negotiate with patients' carriers or employers to obtain reimbursement. Often, workers' compensation carriers would reimburse dentists using the no fault fee schedule. As a result, dentists received no payment or significantly reduced fees when treating workers' compensation cases, and patients experienced delays in attaining treatment, undermining the intent of the program.

NYSDA submitted recommendations to the Workers' Compensation Board for a dental fee schedule based on historical, composite surveys of dental fees throughout the state. NYSDA

explained that, unlike the case with other professions, most dental benefits pay only part of the cost of patients' treatment. Thus, adopting a governmental fee schedule based on carriers' "UCR" schedules would result in fees far below a dentist's actual charges. Because in workers' compensation and no fault cases, doctors cannot charge patients a copayment, this would result in dentists having little incentive to see patients injured in the workplace.

In issuing the new regulations, the Workers' Compensation Board acknowledged NYSDA's help in developing the regulations and fee schedule, which are based on aggregating dentists' actual charges.

Paving the Way for Treatment

New York State laws mandating third-party payment for health care are intended to facilitate access to care for targeted patient populations by eliminating their concerns about the cost of necessary treatment. Both no fault and workers' compensation insure that access for these patient groups is simplified through the creation of government-regulated third-party reimbursement programs with standardized reimbursement.

The goal of these laws is to assure that patients will be able to obtain necessary treatment regardless of whether they have health insurance benefits. The programs they create stipulate fixed reimbursement amounts established by the state government that insulate patients from responsibility for additional, unexpected out-of-pocket

costs. These reimbursement restrictions also serve to limit the liability of the third-party payers, that is, automobile insurers, private workers' compensation carriers and the State Insurance Fund.

Unfortunately, fixed reimbursement limits do not ensure that the doctors providing care to these patients are always adequately reimbursed for the treatment that they render.

The State Workers' Compensation program requires that employers maintain insurance coverage to reimburse the cost of employees' medical treatment resulting from workplace accidents. Similarly, drivers are required to maintain motor vehicle insurance to cover the cost of medical treatment resulting from motor vehicle accidents.

Physicians and dentists treating patients for injuries sustained either in workplace or motor vehicle accidents cannot collect fees in excess of those allowed by the respective governmental fee schedules. And patients cannot establish "private pay" arrangements with their doctors that exceed the current workers' compensation/no fault fee schedule. If the doctor chooses not to accept the workers' compensation/no fault fee schedule, the patient must obtain care from a doctor who will.

The most important requirement of both of these programs is that any treatment provided to patients necessitated by either a motor vehicle accident or a workplace injury, conforms to state government program regulations, regardless of the payer. That is, even if the dentist receives payment directly from the patient instead of the third-party payer, the amount of reimbursement is established by the respective state government program, not the dentist and patient.

Know Who You Are Treating

The new regulations include provisions for prompt payment similar to those in New York State Insurance Law Section 3224-a, the "Prompt Payment" Law. Carriers failing to make payment in accordance with the new fee schedule within 45 days will be deemed to have agreed to the charge and will automatically be liable for paying it.

Dentists should always question patients about the source of any injuries and document this information in patients' charts. No fault and workers' compensation carriers will only provide coverage for treatment necessitated by a motor vehicle or workplace injury. Patients are responsible for the charges associated with all other necessary treatment unrelated to their injuries.

Not knowing whether an injury occurred in the workplace or involved a motor vehicle does not exempt the doctor from workers' compensation or no fault program requirements. Further, treatment costs incurred by patients injured in other types of accidents may be covered through their medical insurance plans.

The current regulations and fee schedule for dentistry are available on the Workers' Compensation Board Web site: <http://www.wcb.state.ny.us>. ■

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Answers to Frequently Asked Questions About Workers' Compensation and No Fault Insurance

Q: I do not accept no fault cases. My patient did not inform the office until after he was billed that he was injured by a car door. Do I have to refund his fees and submit a claim to his automobile carrier?

A: Yes. Any fees collected in excess of the no fault fee schedule established by New York State must be returned. While the doctor must submit a claim to the no fault carrier, payment may be made by the patient or the carrier.

Q: I submitted a claim for reimbursement for a workers' compensation case to the State Insurance Fund. I indicated on the form that I wanted payment sent to my office but the patient has now offered to pay me sooner. Can I collect from the patient instead?

A: If you receive payment from the patient, you would have to refund the money received from the State Insurance Fund to the patient. Workers' compensation and no fault claims include a true "assignment of benefit." That is, if the doctor agrees to accept the carrier's payment, the doctor stands in place of the patient as the recipient. It is then up to the doctor to appeal any disputed payment.

Q: My patient's attorney has advised me that his car insurance benefit has been used up. Can I charge the patient my usual fees for his treatment?

A: No. The maximum fee you can charge is the no fault fee established by New York State.

Q: I do not accept no fault cases. My patient has been a patient in my practice for over 20 years. She was injured in a car accident and wants me to treat her. She is willing to pay my usual fees. Can I treat her?

A: If you treat her, you must accept New York State's no fault fees for her care.

Q: In addition to the restorative treatment necessitated by his accident at work, my patient needs full-mouth periodontal treatment and additional root canal and restorative treatment. Do I submit a claim for all of his necessary dental treatment to his workers' compensation carrier?

A: No. Both workers' compensation and no fault only provide reimbursement for treatment necessitated by the accident.

Q: The workers' compensation fee for my patient's treatment is several hundred dollars less than my usual fees. Can I charge the patient the balance?

A: No. If you accept a workers' compensation or no fault case, the workers' compensation or no fault insurance payment constitutes payment in full.

Recognition and Treatment of Migraine Patient in Dental Practice

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Abstract

Migraine headache is a common, disabling clinical problem afflicting millions of Americans. Many dental problems are related to headaches and many conditions can cause orofacial pain and headaches, which complicates a definitive diagnosis. Temporomandibular joint disorders, toothache, jaw and sinus pain often coexist with headaches. A toothache of nonodontogenic origin may require a team of dentists and physicians to diagnosis and manage. It is important for the dentist to recognize and understand the management of common headaches, such as migraine, and be able to differentiate between a nonodontogenic headache and a “real” toothache.

INDIVIDUALS WITH chronic pain lasting more than three to six months may experience multiple types of pain in the head and neck region, including headache and facial pain.¹ Temporomandibular disorders are a common cause of orofacial pain and can coexist with a headache presenting in the temporal and frontal regions.¹ Many dental patients may present with symptoms in these regions. Approximately 40 to 45 million people in the United States suffer from one type of headache on a regular basis. Headaches have a major impact on society, because they cause individuals to miss days from work.

This article reviews the classifications and pathogenesis of headache disorders, various pharmacologic and nonpharmacologic treatments of migraine, and the dentist’s role in patient education.

Classification

“The International Classification of Headaches,” 2nd Edition, published by The International Headache Society, classifies headache disorders (Table 1). Headaches are generally classified into primary and secondary headaches. Primary headache disorders are the result of a primary neurologic process without an underlying cause. Primary headache disorders include migraine, tension-type headache, cluster headache and other trigeminal autonomic cephalalgias. Primary headache disorders are subdivided one, two or three times into headache types, subtypes and subforms,² based on the presence or absence of symptoms or the frequency of attacks.

Secondary headache disorders result from a specific underlying cause and include headache attributed to head and/or neck trauma, infection, a substance or its withdrawal, cranial or cervical vascular disorder, non-vascular intracranial disorder, psychiatric disorder, and headache or facial pain attributed to a disorder of the cranium, neck, eyes, ears, nose sinuses, teeth, mouth or other facial or cranial structures.

Dental Implications

Understanding the various mechanisms of migraine may also explain why migraine sufferers can experience different types of symptoms. For instance, during a migraine, stimulation of the trigeminal nerve (5th cranial nerve, carrying sensory information from the face) may cause referral of pain to any of the nerve’s three branches, resulting in facial pain. It can also cause referral of pain to the sensory nerves of the posterior head and neck area, causing neck pain.

Migraine Origins and Effects

Migraine is believed to be induced by a neurochemical reaction involving the trigeminovascular system and not the result of a primarily vascular event. Although vascular changes (vasodilation or

TABLE 1

Stage	Occurrence	Symptoms	Etiology
Prodrome	Hours/days before the headache 40-60% of people ¹⁰	Thirst, craving (e.g., chocolate), tired, fluid retention	Dysfunction in hypothalamus ¹¹
Aura (visual, sensory, motor)	Hours/days before migraine or with migraine. Lasts less than 60 minutes	Visual aura, which is present in up to 99% of individuals, may be manifested as bright flashing lights, specks of light, geometric shapes, shimmering; ¹² sensory aura, which is present in up to 40% of individuals, may take the form of a paresthesia that involves the arm, face, hands and body or cheiroaural numbness, which is a tingling, followed by numbness starting in the hand and going superiorly up the arm and to the face, where it is felt round the lips and mouth on the same side of the numbness. ¹⁵	Transient episode of focal neurologic dysfunction caused by an imbalance between excitatory and inhibitory neuronal activity at different levels in the central nervous system, ¹¹ caused by a wave of cortical spreading depression (CSD) moving across the cerebral cortex, resulting in depressed neuronal activity and intense neuronal activity. ^{13,14}
Headache	Begins during the aura or follows the aura within 60 minutes	Unilateral and throbbing	Cause is primarily neurologic, not vascular. ^{8,11,16} Release of substances such as substance P, neurokinin A, calcitonin gene-related peptide and nitric oxide, which interact with blood vessel wall to produce dilation, protein extravasation and sterile inflammation, stimulating trigemino-cervical complex. ^{9,17} Sudden rise in 5-HT (serotonin) levels at onset of migraine. ¹⁸
Postdrome	25% of individuals	Changes in mood and behavior after migraine attack	Precipitating factors include caffeine (and caffeine withdrawal), menstruation, stress, smoking, lack of sleep, certain foods, and strenuous exercise. ¹¹

inflammation, for example) do occur, they are not related to the clinical features of the migraine.⁸ Stimulation of the trigeminal nerve causes the release of vasoactive peptides, which are responsible for the head pain as well as the facial and neck pain experienced during migraine. These symptoms are often misdiagnosed as a sinus or tension headache.⁸

There are four phases of a migraine. They are, prodrome, aura, headache (pain) and postdrome.⁹

Migraine Triggers

Various environmental, hormonal, dietary and psychological factors can trigger a migraine. Common migraine triggers include stress, emotions (depression, anxiety and/or fear, for example), hormonal changes (premenstrual), weather changes, vapors, noises and foods. Common food triggers are MSG, alcohol, tyramine-containing foods (pickled herring, aged cheese and yeast products, for example), chocolate, excessive caffeine and nitrites.

Drug Therapy

Only about half of migraine headache sufferers seek medical attention, and only about half of these are properly diagnosed.¹⁹ Drug therapy is aimed at aborting a migraine when it occurs, providing symptomatic pain relief and preventing a migraine from reoccurring.²¹ Any symptomatic therapy, either prescription or OTC analgesics, should take place more than twice a week. Beyond that, the patient should be taking preventative medications. Therapy should start by eliminating all products containing caffeine, which causes vasoconstriction.

What follows is a discussion of the classifications of drugs used to treat acute migraine attacks and for prophylaxis (chronic therapy) (Table 2).

Abortive Drug Treatment

Triptans

First introduced in the United States in the late 1990s, triptans (hydroxytryptamine receptor agonists) are effective, and they are well tolerated for the initial treatment of acute, moderate or severe

migraine to abort the attack. They are also used in patients with mild-to-moderate migraine who respond poorly to nonsteroidal anti-inflammatory drugs.^{21,22}

Triptans bind with high affinity to the 5-HT_{1B/1D} receptor and are referred to as selective serotonin agonists. Activation of these receptors results in cranial vessel constriction, inhibition of neuropeptide release and reduction in transmission in trigeminal

pain pathways. They have a rapid onset of action.

Available formulations include oral, suppositories, injections and nasal sprays. Orally administered triptans provide pain relief within 30 minutes, whereas injected sumatriptan has an onset of action in less than 15 minutes.

Triptans are primarily metabolized by monoamine oxidase enzymes, similar to monoamine oxidase inhibitors (MAO), pre-

TABLE 2
Drugs Used in Treatment of Headaches

Drug Name	Indication/Dosage Form	Dental Management
TRIPTANS Eletriptan (Relpax) Frovatriptan (Frova) Naratriptan (Amerge) Rizatriptan (MAXALT, MAXALT-MLT) Sumatriptan (Imitrex) <i>Sumatriptan/naproxen sodium (Trexima)</i> Zolmitriptan (Zomig)	Acute treatment (abortive) of migraine; not for prevention Tablet Tablet Tablet Tablet, orally disintegrating tablet Tablet, nasal spray, injection (for immediate relief) Tablet, orally disintegrating tablets, nasal spray Tablets	Caution should be used when using local anesthetics containing epinephrine. The patient's blood pressure should be monitored.
ANALGESICS Acetaminophen (Tylenol) Aspirin, acetaminophen and caffeine (Excedrin Migraine) NSAIDs Ibuprofen (Advil, Motrin, Nuprin) Naproxen (Aleve) NARCOTIC ANALGESICS Codeine, acetaminophen, caffeine, butalbital (Fioricet)	Acute symptoms Tablet, capsule, caplet Tablet Tablet Tablet Tablet	No contraindications or precautions with epinephrine.
ERGOT Ergotamine (Ergomar) Ergotamine/caffeine (Carfergot)	Acute symptoms, abort attack Sublingual tablet Tablet, suppositories	No contraindications or precautions with epinephrine use.
ANTICONVULSANTS Topiramate (Topamax) Valproic acid (Depakote)	Prophylaxis Tablet, sprinkle capsule Tablet, sprinkle capsule, capsule	No contraindications or precautions with epinephrine use.
CALCIUM CHANNEL BLOCKERS Diltiazem (Cardizem) Nifedipine (Procardia) Verapamil (Calan, Isoptin)	Prophylaxis Tablet Tablet Tablet	No contraindications or precautions with epinephrine.
BETA BLOCKERS Propranolol (Inderal) Timolol (Blocadren)	Prophylaxis Tablet Tablet	The amount of epinephrine should be limited to 0.04mg (2 cartridges of 1:100,000) when taking a nonselective beta-blocker.
TRICYCLIC ANTIDEPRESSANTS Amitriptyline (Elavil) Imipramine (Tofranil) Nortriptyline (Pamelor) Protriptyline (Vivactil)	Prophylaxis Tablet Tablet Capsules, solution Tablet	The dose of epinephrine should be limited to 0.04mg.
BOTULINUM TOXIN Botulinum Toxin Type A (Botox)	Prophylaxis Injection	No contraindications or precautions for epinephrine use.

scribed for depression. Taking triptans and MAO-A inhibitors together generally leads to an increase of triptan blood levels; therefore, it is necessary to wait more than two weeks after the MAO inhibitor is discontinued before administering triptans.

Triptans are contraindicated in patients with ischemic heart disease (angina pectoris, history of myocardial infarction or silent ischemia, for example) or in patients who have symptoms of ischemic heart disease and coronary artery vasospasm. Triptans may increase blood pressure and should not be given to patients with uncontrolled hypertension.

The combined use of triptans and antidepressants, including selective serotonin reuptake inhibitors (SSRIs) or selective serotonin/norepinephrine reuptake inhibitors (SNRIs), may cause a serotonin syndrome, resulting from excessive blood levels of serotonin; however the risk is low.^{23,24} And the use of triptans may not be associated with increased risk of any ischemic events.²⁵ Signs and symptoms of serotonin syndrome include restlessness, hallucinations, fast heart beat, diarrhea, nausea, vomiting and fast changes in blood pressure. It is more likely to occur when starting or increasing the dose of a triptan, SSRI or SNRI. This combination is not contraindicated, but care should be taken when the two drugs are taken concurrently.

Common adverse reactions include head and jaw discomfort, flushing, dizziness, sleepiness and tiredness.

Ergot Derivatives

Drugs such as ergotamine (Ergomar) and dihydroergotamine nasal spray (D.H.E. 45, Migranal) are alpha-adrenergic blockers and vasoconstrictors of cranial smooth muscle and are considered in the treatment of selected patients with moderate or severe migraine.²² Caffeine, a vasoconstrictor, is added to enhance absorption and potentiate analgesia.²⁶ Elevated blood levels of ergot derivative occur when it is taken with erythromycin and clarithromycin.

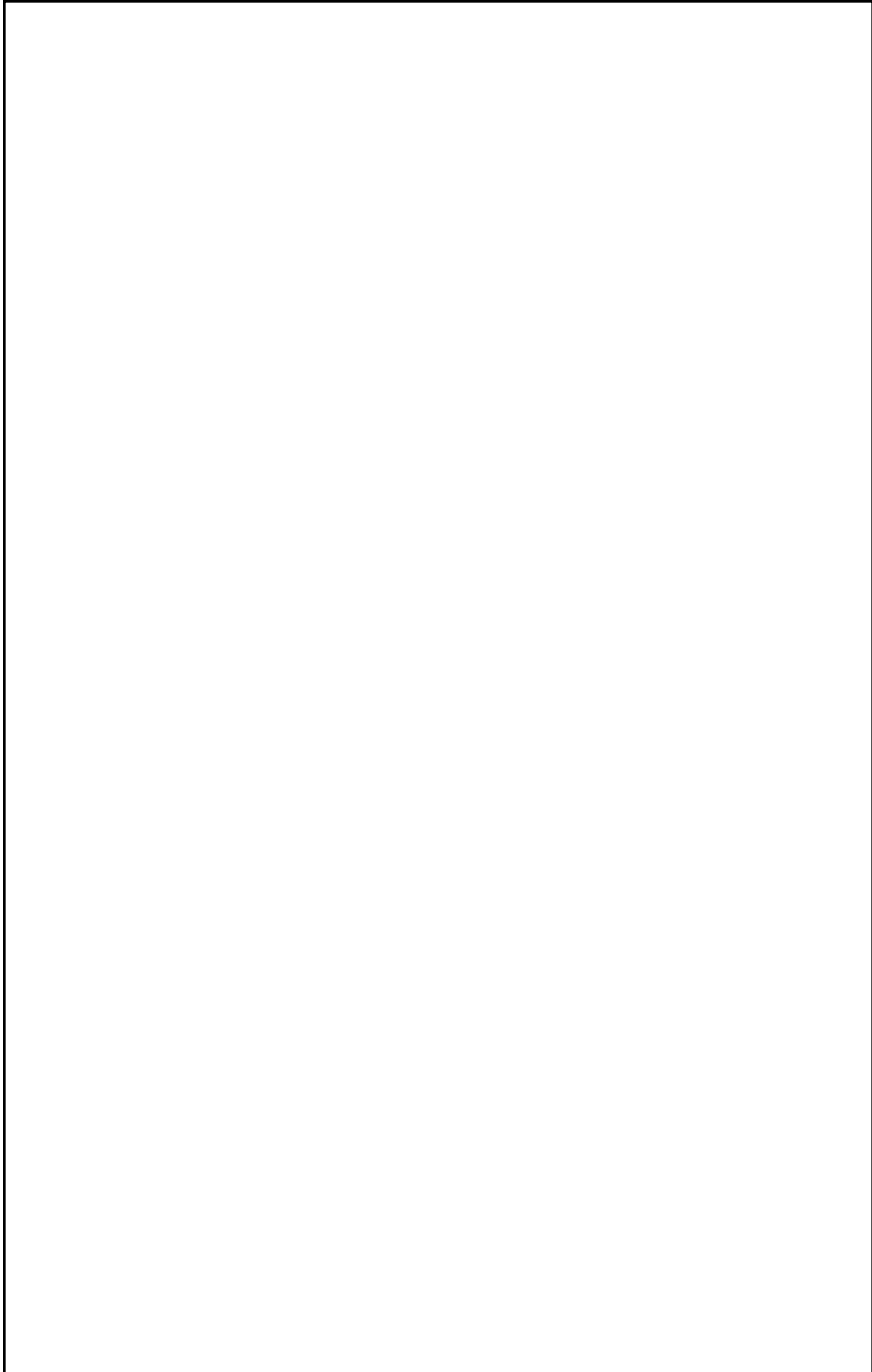
Many adverse effects, including nausea, localized edema and itching, and numbness and tingling in fingers and toes, preclude using it long-term and for prevention. Prolonged use may cause significant medication-overuse headache (formerly known as rebound headache). Ergotamine derivatives are contraindicated in patients with peripheral vascular disease, hepatic or renal disease, coronary artery disease, hypertension, sepsis or pregnancy (FDA Pregnancy Category X).

Analgesics

For mild migraine attacks, analgesics alone or in combination with caffeine are the drug of

choice.²⁷ Overuse of analgesics and caffeine can aggravate the migraine (medication-overuse headaches). Most of the pain relievers that patients use are over-the-counter. Caffeine is added to enhance the drug's absorption and to potentiate the drug's activity. Excedrin Migraine, which is the same as regular Excedrin, contains acetaminophen, aspirin and caffeine. Two tablets contain the same amount of caffeine as a cup of coffee.

Long-term use of analgesics is discouraged as this may lead to medication-overuse headache on withdrawal. Adverse effects include gastrointestinal upset and bleeding, and nausea. Non-steroidal anti-



inflammatory drugs, including ibuprofen and naproxen, reduce the release of serotonin and can be used in combination with triptans.²⁸

Narcotic analgesics, which are used for more severe pain, are not FDA approved. Their use may carry a greater risk of medication-overuse headache and they have the potential for abuse and dependency. Refractory patients may require narcotic injections for acute attacks.²⁹

Prophylactic Drug Treatment

The choice of a drug for prevention is based upon the adverse effect profile of the drug and the medical status of the patient. Prophylaxis should reduce or eliminate the need for abortive drugs.

Anticonvulsants

Topiramate (Topamax) is approved for migraine prevention in adults.³⁰ It is a sulfamate-substituted monosaccharide with a broad spectrum of anticonvulsant activity. Common adverse effects include lowered bicarbonate levels in the blood, resulting in an increase in the acidity of the blood (metabolic acidosis) and hyperventilation (rapid, deep breathing) or fatigue. Maintenance of adequate fluid intake is important to minimize the risk of renal stone formation. Other side effects are tingling in arms and legs, loss of appetite, nausea, diarrhea, taste change and weight loss.³¹

Valproic acid (Valproate) is approved for migraine prophylaxis and can take up to two to three weeks to be effective. Common adverse effects include weight gain, sedation and xerostomia, which may preclude its use in certain patients.

Levetiracetam (Keppra) and zonisamide (Zonegran) work off-label.

Beta Blockers

The use of beta blockers for the treatment of migraines started in the 1960s when patients being treated for heart problems found that their migraine pain had lessened. The mechanism of action may be the limiting of the tendency for cranial blood vessels to overdilate. It can take up to four to six weeks to see a reduction in migraine frequency.

Timolol and propranolol are both FDA-approved prophylactic agents, but propranolol has more research evidence of efficacy than timolol.

Calcium Channel Blockers

Similar to beta blockers, calcium channel blockers were originally used to treat cardiovascular conditions. These drugs may also work by stabilizing blood vessel membranes by preventing them from overdilating. It can take up to two months to see effects.

Tricyclic Antidepressants

Antidepressants are used for their analgesic effect in migraine prevention. A lower dose is prescribed than would be used for treating depression, and it can take up to three to four weeks before the drug is effective.³²

Botulinum Toxin Type A

Injections of botulinum toxin type A (Botox), which is a purified protein from the bacteria, *Clostridium botulinum*, besides being used cosmetically and for dystonia (sustained contraction of muscles), has been used to prevent migraines for up to six months. They are used as well in refractory chronic migraine in patients who previously failed to respond to at least three prophylactic medications. Botox is injected into

the muscles of the brow, eyes, forehead, side of the head and back of the head near the neck. A limitation to the use of Botox is its high cost.

Although the exact mechanism is unclear, it has been hypothesized that it works by inhibiting the release of transmitters from the pain-sensitive nerve endings.³³

Alternative Treatments

Some alternative medications used in the prophylaxis of migraine include feverfew, petasites, magnesium, riboflavin, coenzyme Q10 and melatonin. There are no randomized, controlled studies of the use of melatonin.^{34,35} And there is concern about the lack of standardization regarding the contents and purity of herbal supplements.

A number of alternative treatments have been recommended for the treatment and prevention of migraine, including hypnosis, biofeedback, meditation, acupuncture, massage, transcutaneous electrical nerve stimulation and magnesium supplements.

Conclusions

Since many conditions can present as orofacial pain, the dentist must be able to make a differential diagnosis as to whether the pain is of odontogenic origin (for example, endodontic or TMJ disorder) or nonodontogenic origin (for example, migraine). Dentists can be involved in the recognition and treatment of patients who have both orofacial pain and headaches. ■

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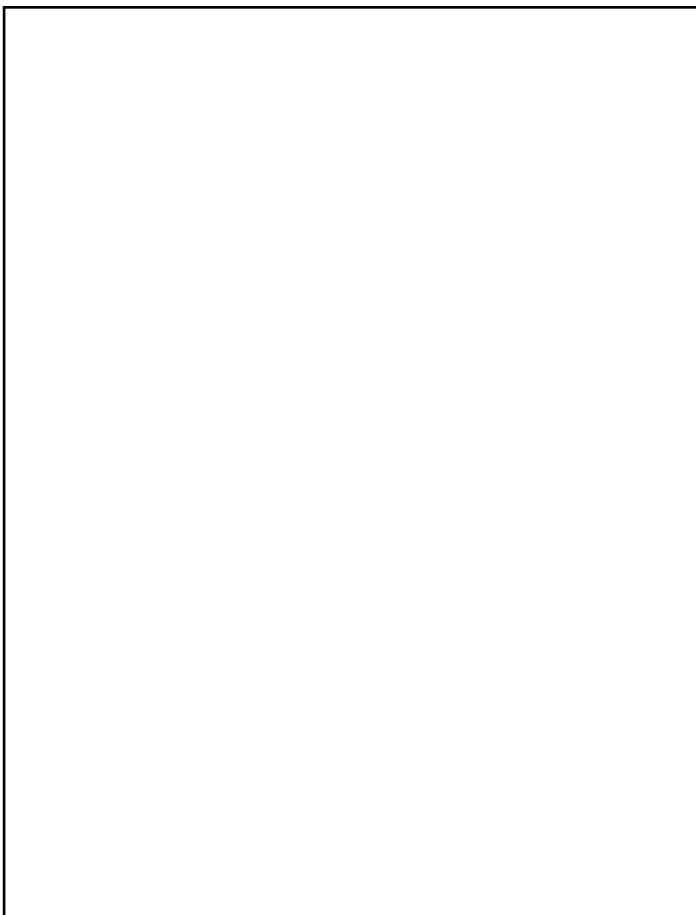
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Apexification of Non-Vital Pre-Molar Stemming from Possible Dens Evaginatus

Ali Asgari, D.D.S.; Elan Kaufman, D.M.D.; Paraskevas Kourtsounis, D.D.S.; Michael Baharestani, D.D.S.

Abstract

Dens evaginatus is a dental anomaly that occurs more commonly in pre-molar teeth. Although not a cause for alarm in most instances, it can lead to serious consequences if it is damaged. This paper explores the treatment of a necrotic pre-molar with an open apex that caused serious facial swelling in an adolescent patient. It is believed that this swelling was the result of an enamel tubercle, or dens evaginatus, which was knocked off or traumatized.

DENS EVAGINATUS is a dental anomaly in which an extra tubercle is formed on the outer surface of the enamel. It occurs during the morphodifferentiation phase of tooth development,⁹ where an abnormal proliferation of the inner enamel epithelium goes into the stellate reticulum of the enamel organ.^{1,2} Although it can occur in the molars, canines and incisors, it occurs more commonly in the pre-molars,³ and is located predominantly in the mandible.⁴

The total prevalence of dens evaginatus is between 1% and 4%,^{4,5} and it has a racial predilection, occurring more commonly in people of Mongoloid origin. Reported cases have been between 3% and 5% of Chinese and Eskimos populations; yet it has shown to be a rare occurrence in the white population.^{6,7,8}

Although not a problem by itself, it can lead to devastating consequences if it is damaged or disturbed. The enamel tubercle contains within its structure vital pulp and dentin tissue.^{2,5} Because

of its location, which is generally on either of the cusps or in the center of the tooth, these enamel tubercles can be easily damaged or worn off during normal masticatory function. Often, this can lead to a pulpal exposure, resulting in either a non-vital tooth, facial infection in the form of an abscess or cellulitis, or even an osteomyelitis of the jaw.^{7,10}

The treatment of affected teeth can vary depending on the circumstances, and many different protocols have been utilized through the years. Extraction was previously the favored treatment for this condition because of the abnormal canal morphology and open apices. Other clinicians have suggested selective and progressive grinding of the tubercle to stimulate reparative dentin formation.¹¹ Sealing the tubercle with sealant material as well as preventive resin restoration or amalgam has also been examined, but it was determined that these restorations actually predisposed the tooth to more occlusal forces and abrasion.^{2,12}

The current treatments being utilized are apexification in non-vital teeth with an open apex using either calcium hydroxide or MTA, apexogenesis in vital teeth with an immature apex by performing a vital pulpotomy,¹⁰ or extraction in cases where the root is short and wide open or in cases where the patient has severe crowding and future orthodontic extraction may be necessary. Also, extraction may be necessary in supernumerary teeth with this associated condition, where retaining the tooth is of little value.^{13,14}

Case Presentation

A 10-year-old boy presented to the office with the chief complaint of pain in the lower right area. Upon clinical examination an extraoral



Figure 1. Facial swelling.



Figure 2. Pre-operative radiograph.



Figure 3. Intraoral picture.

facial swelling was discovered on the right side bordering the angle to the body of the mandible. The mass was fluctuant and the area was tender to palpation. Intraoral examination revealed a sinus tract on tooth #29, and the tooth was tender to palpation and percussion. Tooth #A had also supererupted into the occlusal plane of #29, which was not fully erupted yet, and #29 had a mobility of Class II.

Radiographic examination revealed a large periapical radiolucency around the apex of tooth #29. Also of considerable importance was that the apex and root of the tooth were not completely developed. Clinical examination did not reveal any carious lesions on the occlusal surface of the tooth, and radiographic examination did not reveal interproximal lesions, which could have potentially been the source of the periapical radiolucency.

Periodontal probing revealed pocket depths of 8 mm to 10 mm around the facial surfaces of the tooth. The pocket depths were recorded as 6 mm, 8 mm and 10 mm around the disto-lingual, lingual and mesio-lingual surfaces of the tooth, respectively. In the absence of caries and because the pocket depths were so large, an initial differential diagnosis of a possible perio-endo lesion was made. The probing depths did not reach the apex of the tooth, however, leading to another possibility as the cause of the lesion.

Further clinical examination revealed that the patient had other enamel tubercles present on the contralateral pre-molar teeth. The prevalence of numerous dens evaginatus in this patient led to the hypothesis that tooth #29 had a possible dens evaginatus that might have been knocked off or ground down and caused the necrotic pulp, leading to facial swelling.^{15,16,17}

Initially, because of the large size and location of the facial swelling, the patient was sent to the emergency room and admitted for intravenous antibiotics. The following day, an incision was made and drainage was performed on the lower right side of the face. Tooth #A was extracted at this time as it was mobile and was in contact with #29. Extracting the opposing primary tooth also removed any excessive occlusal trauma to the tooth that was being treated. The patient was discharged and seen in the outpatient setting again for treatment of the necrotic tooth.

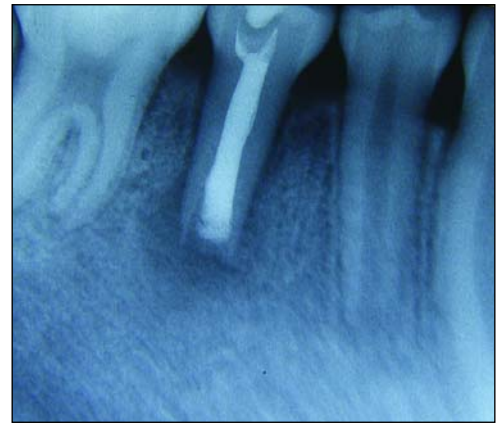


Figure 4. One-month follow-up.

Thermal and vitality testing yielded a no response. It was determined that the tooth was necrotic, as expected, from the large area at the apex. Several treatment options were considered with regard to the long-term prognosis of the tooth and the future orthodontic implications for the patient. If the patient demonstrated a Class II malocclusion that would eventually require pre-molar extractions, the decision would have favored extraction;^{13,14} however this was not the case. Endodontic therapy was considered a viable option after consulting with endodontic specialists. The major factors considered for the treatment of this tooth included a large open apex and a tooth that had potentially lost its eruptive forces. After consultation with the appropriate specialists, it was decided to attempt apexification since the tooth was non-vital.¹⁸

The child did have some behavior management issues associated with fear and anxiety. It was determined that it would be in his best interest to have the procedure completed at the pediatric dental office. The tooth was anesthetized for rubber dam placement and the canal accessed with a high-speed handpiece. The necrotic remainder of the pulp tissue was removed with appropriate endodontic files and broaches. Calcium hydroxide was used, and a radiograph was taken to confirm that the material reached the apex of the tooth.¹⁹ Although some material was extruded past the apex,



Figure 5. Three-month follow-up.



Figure 6. Eight-month follow-up.



Figure 7. Final obturation.

this resorbed fairly quickly as evident by the radiograph taken at the one-month follow-up.

The calcium hydroxide was changed at three-month intervals for a period of one year, and an apical dentin bridge was formed. Periapical healing can be seen on the radiograph from the one-year recall.²⁰ The tooth was then cleaned, taking care not to fracture the delicate apical one-third of the tooth and obturated with the appropriate gutta-percha cones and sealer. The tooth was restored with glass ionomer and a composite and the patient placed on routine recall visits. The periapical radiolucency had resolved completely and the patient was completely free from pain and discomfort.

Discussion

Dens evaginatus represents a moderately occurring dental anomaly with potentially deleterious consequences. Although appearing benign at first glance, these dental tubercles can be the source of serious and harmful outcomes. Because they are small and friable, yet contain vital pulpal and vascular tissue, disrupting them can cause associated endodontic complications. The presence of periapical pathology in the absence of caries and periodontal involvement in an adolescent patient should include a differential diagnosis of a damaged dens evaginatus. The question also remains as to the appropriate prophylactic treatment of these tubercles once recognized.

Because their disruption could lead to associated pathology, care must be taken when attempting to smooth them out with a handpiece. Also, sealing over them or placing a preventive resin restoration could predispose them to more occlusal wear and cause them to become disrupted with the opposing dentition during normal masticatory function.

Although no one specific protocol exists in treating these anomalies, the practitioner should be fully aware of the probable sequelae that can result and be prepared to make the appropriate diagnosis and referral if required. ■

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Hemifacial Microsomia

A REPORT OF TWO CASES

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Abstract

Hemifacial microsomia (HFM) is an asymmetrical congenital deformity of the head and face caused by anomalous development of the structures derived from the first and second branchial arches. Oral and maxillofacial malformations present diagnostic and treatment challenges unique to the dental profession. The etiology, a report of two cases and a brief description of treatment modalities are discussed in this article.

HEMIFACIAL MICROSOMIA (HFM) is a common birth defect caused by a unilateral arrest or dysplastic development of the first and second branchial arches and the intervening first pharyngeal pouch and branchial cleft. This results in unilateral hypoplastic development of the external and middle ear, ramus and condyles of the mandible, zygoma and facial muscles.¹⁻⁴ The phenotype of this condition is highly variable and many transitional forms exist. Some of the most commonly used terms are Goldenhar syndrome, oculoauricular vertebral dysplasia, otomandibular dystosis, lateral facial dysplasia and craniofacial microsomia.¹

Goldenhar's original description has other associated anomalies, including upper eyelid colobomas, subconjunctival lipomas, micrognathia, cleft or high-arched palate and congenital heart diseases.⁵ However, it was not until 1963 that Gorlin et al.⁶ recognized that these Goldenhar-related conditions could also be associated with developmental anomalies of the vertebral column. They suggested the designation oculoauricular vertebral dysplasia to include the three predominant groups of malformations.

Smith⁷ used the term facio-auriculo-vertebral spectrum to include both hemifacial microsomia and Goldenhar syndrome, along with the phenotypic spectrum of similar conditions.

Because of the array of clinical manifestations, various classifications have been put forward, ranging from the earliest classification by Pruzansky in 1969,⁸ the SAT (skeletal, auricular, soft tissue) classification by David et al. in 1987,⁸ and OMENS (orbit, mandible, ear, cranial nerves, soft tissues) classification by Vento et al. in 1991 (Table 1).⁹

The widely accepted OMENS system of classification addresses the five major manifestations of HFM and allows each to be graded separately according to severity. Categories are totally independent, and every clinical situation, including "normal," is represented in each group. This allows for greater flexibility in categorization and eliminates challenges to the system that fail to conform to the usual patterns of HFM. It is comprehensive, readily applicable, reproducible and easily modified to changes associated with age, growth and therapy. Categorization of patients in this manner can be used to predict timing and type of orthodontic and operative correction. Individual categories can be explained to fit the needs of individual investigators.¹⁰

This article presents two cases of HFM, which underscore the need for early diagnosis and management of the deformity.

Case One

A 40-year-old-male patient reported to the Department of Oral Medicine and Radiology at SDM College of Dental Sciences & Hospital in Dharwad, India, with the complaint of pain in the lower jaw, which he had experienced for the past six months. History revealed that the patient had unilateral deafness on the left side. Extraoral examination revealed facial asymmetry with deviation of the chin to the left and associated depression of malar prominence, including soft-tissue deficit. The nasal bridge appeared to be

TABLE 1
OMENS CLASSIFICATION

ORBIT CATEGORIES	O ₀	Normal orbital size and position
	O ₁	Normal orbital size and position
	O ₂	Abnormal orbital position (O2 ₁ or O2 ₂ depending on horizontal position of orbit relative to less affected size)
	O ₃	Abnormal orbital size and position
MANDIBLE CATEGORIES	M ₀	Normal mandible
	M ₁	Small mandible and glenoid fossa with short ramus
	M ₂	Short and abnormally shaped ramus (M2 ₁ if glenoid fossa is in similar position to opposite TMJ: M2 ₂ if TMJ is inferiorly medially and anteriorly displaced with severely hypoplastic condyle)
	M ₃	Complete absence of ramus, glenoid fossa and TMJ
EAR CATEGORIES	E ₀	Normal ear
	E ₁	Mild hypoplasia and cupping with all structures present
	E ₂	Absence of external auditory canal with variable hypoplasia of concha
	E ₃	Malpositioned lobule with absent auricle
NERVE(VIith) CATEGORIES	N ₀	Normal facial nerve
	N ₁	Upper facial nerve involvement (temporal and Zygomatic branches)
	N ₂	Lower facial nerve involvement (buccal, mandibular and cervical branches)
	N ₃	All branches of facial nerve affected
SOFT TISSUE CATEGORIES	S ₀	No obvious soft tissue or muscle deficiency
	S ₁	Minimal subcutaneous / muscle deficiency
	S ₂	Moderate deficiency
	S ₃	Severe deficiency due to subcutaneous & muscular hypoplasia

depressed along with hypertelorism. Also observed was the absence of the left pinna with only the presence of ear tags (Figure 1). Temporomandibular joint (TMJ) movements were normal, with mandibular hypoplasia on the left. Intraoral examination revealed multiple missing permanent teeth. Salivary flow from the major salivary glands appeared to be normal.

An orthopantomograph (OPG) of the patient revealed hypoplasia of the ramus, body of the mandible, condyle and the coronoid process on the left side. Multiple missing posterior teeth with generalized moderate horizontal bone loss of both quadrants were also observed (Figure 2). The paranasal sinus view (PNS) revealed hypoplastic maxillary sinus on the affected side (Figure 3). Chest X-ray findings were normal.

Case Two

A 16-year-old-female patient reported to the hospital with the complaint of pain in the lower posterior teeth, which had been present for the past three months. Medical examination showed all systems to be normal. Extraoral examination revealed that the patient had a short neck, with mild asymmetry with hypoplasia of the right side of the face, but no associated soft-tissue deficit. The pinna on the right side was completely absent and only ear tags were present (Figures 4, 5). The auditory canal, however, was patent, and there was no hearing loss. Intraoral examination revealed salivary flow from the major salivary glands to be normal and clinically missing right mandibular molar and third molars in all quadrants. OPG showed impacted third molars in the maxillary right quadrant and in both quadrants of the mandible (Figure 6).

Cervical spine radiographs antero-posterior (AP) and lateral views revealed partially fused T4 and T5, and fusion of C3 and C4 posteriorly (Figure 7). A chest X-ray revealed crowding of ribs, with normal lung fields (Figure 8).



Figure 1. Hypoplasia of malar region. Mandible on left side with depressed nasal bridge and absent left pinna.

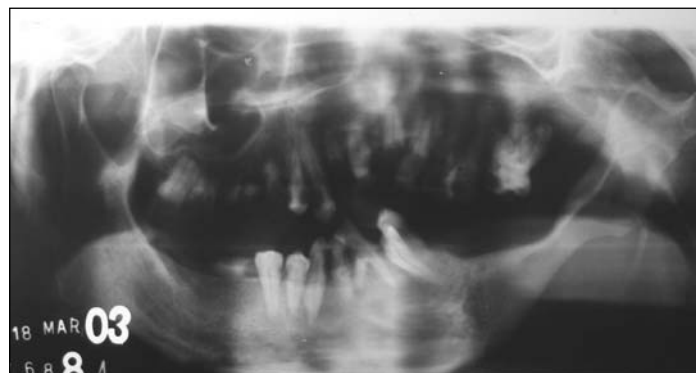


Figure 2. OPG revealing severe hypoplasia of left body, ramus, condyle and coronoid process of mandible with malformed glenoid fossa.

TABLE 2**Spectrum of Manifestations of Hemifacial Microsomia**

EAR	Anotia, Microtia, Peauricular tags, Supernumerary tags, Narrow External auditory canal, Conductive or sensorineural hearing loss
EYE	Blepharoptosis, Anophthalmia, Microphthalmia, Epibulbar tumors, Unilateral colobomas of upper eyelid, Esotropia, Extopia
FACIES	Asymmetry; Hypoplastic and flattened maxilla; Temporal and malar bones; Hypoplastic mandible, including condyle, coronoid process & glenoid fossa. Agenesis/hypoplasia of ramus
ORAL	Macrostomia due to lateral clefts, Agenesis of parotid gland, Displaced salivary gland tissue, Decreased palatal width of affected side, Hypoplastic tongue muscles, Cleft lip and palate, Canting of occlusal plane with malocclusion, Delayed tooth development
CNS	Mental retardation, Abnormal course of VII cranial nerve, Unilateral aplasia of trigeminal nuclei, Intracranial lipomas, dermoids
SKULL	Cranium bifidum, Microcephaly, Dolicocephaly plagiocephaly
SKELETAL	Spina bifida, Scoliosis, Fused or hypoplastic vertebrae, Unilateral hypoplasia of middle cranial fossa
CARDIAC	VSD, Tetralogy of fallot, Transposition of great vessels, PDA, Dextrocardia, Pulmonary stenosis, Cardiomegaly, Hypoplasia of ECA
LUNG	Hypoplasia of lung, Agenesis of lung
KIDNEY	Absent kidney, Double ureter, renal ectopia, hydronephrosis
GIT	Imperforate anus, Rectovaginal fistula



Figure 3. PNS view revealing hypoplastic malar prominence and non-pneumatized hypoplastic left maxillary sinus.



Figure 4. Mild hypoplasia on right side with missing pinna on right side.



Figure 5. Patient presenting with short neck.

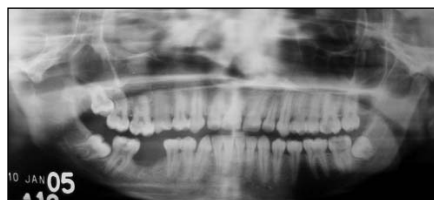


Figure 6. OPG reveals mild hypoplasia right side of mandible, impacted third molars in maxillary right quadrant and in both quadrants of mandible.

It was noted that in both patients their medical and family histories were not contributory. In view of the characteristic features, the cases were diagnosed as HFM with varying degree of severity. The OMENS classification to categorize the same was given as O3 M2_g E 3 N1 S2, 00 M0 E3 N0 S1 for Case One and Two, respectively.

Discussion

HFM represents a complex constellation of asymmetric anomalies involving both the bone and soft tissues. Incidence of the condition is said to be 1 in 5600 (Poswillo).⁹ It has also been postulated that twins, predominantly monozygotic, are more likely to be affected than singletons.¹¹

This condition presents with widespread manifestations (Table 2). The etiology of HFM has baffled clinicians since the first reported cases by Canton in 1861 and von Arlt in 1881.¹² Further inroads have been made regarding the etiology of the disorder after the detection of mutation of the 23kb segment in mouse chromosome 10, which investigators have designated HFM, for the HFM-associated locus. This gives further credence to the theory postulated by Poswillo, namely, that the rupture of the stapedia artery was the first pathological event in these genetically engineered mice.¹³ The severity of the clinical condition is said to correlate with the amount of hemorrhage. It is now believed that the anomaly occurs as the result of the early loss of neural crest cells.¹⁴ The cause of the extracranial manifestations could be due to the defect or the disruption of the mesodermal cell migration anywhere along the embryonal caudal to rostral axis in the primitive streak.⁸

The manifestations of HFM become more characteristic as the child advances in age, making way for an easier diagnosis. The availability of advanced imaging modalities like computed tomography (CT) and magnetic resonance imaging (MRI) further facilitate better detection and management of multisystem involvement in these patients.

The severity of the extracranial manifestations, like the high incidence of mental retardation and cardiac anomalies, increases the importance of an early diagnosis. Ultrasonography (USG) is one of the most noninvasive, inexpensive and safe investigative

TABLE 3**Differential Diagnosis of Hemifacial Microsomia**

Structures Involved	Syndromes					
	HFM	Mandibuloaofacial dysostosis	Nager Acrofacial dysostosis	Maxillofacial dysostosis	Townes- Brocks syndrome	Branchio- oto-renal syndrome
Eye	Blepharoptosis, Anophthalmia Epibulbar tumors, Epibulbar tumors Unilateral colobomas U eyelid	Colobomas of outer 3rd of lower eyelid. Palpebral fissures slanting downwards. Hypertelorism	Colobomas- Rare (of lower eyelid)	Palpebral fissures slanting downwards	No abnormalities reported	Strabismus
Ear	Peauricular tags, Anotia, Microtia, Supernumerary tags, narrowEAC, Conductive or sensorineural hearing loss	Malformed/ crumpled	External ear defects	Minor changes of pinnae	Hypoplastic ears	Anomalous pinnae
Facies	Asymmetry, max, temporal and malar bones hypoplastic and flattened	Bilateral symmetric, Long narrow face, Large downturned mouth, Hypoplastic zygomas, Depressed cheek bones, Receding chin	Bilateral symmetric, Long narrow face, Large downturned mouth, Hypoplastic zygomas, Depressed cheek bones, Receding chin	Bilateral hypoplasia of malar bones, Maxillary hypoplasia	No abnormalities reported	
Mandible	Agenesis or Hypoplasia	Severely Hypoplastic condyle, Short condylar neck, Concave undersurface of mandible. Angle is more obtuse.	More retarded mandible	Normal	No abnormalities reported	Asymmetry (rare)
Dental/oral manifestations	Hypodontia, Delayed tooth development, Agenesis of parotid gland, Decreased palatal width of affected side, Cleft lip and palate	Cleft lip / palate, Pharyngeal hypoplasia	Frequent cleft palate	Open bite	No abnormalities reported	High arched palate/ cleft palate, bifid uvula
CNS/ mental status	Facial N palsy, Normal intelligence	Normal intelligence	Mental retardation	Retarded/ abnormal speech	No abnormalities reported	No changes reported
Skeletal defects/ alterations	Cervical vertebral fusions, Platybasia	Hypoplastic supraorbital ridges, Mastoids non pneumatized, Paranasal sinuses absent/ small	Fusion of radius & ulna	Cervical vertebral fusions, Platybasia	Defect of Preaxial part of distal U limb	No changes reported
Thumb anomalies	Absent	Absent	Hypoplastic/ absent, asymmetric	Absent	Bifid, Supernumerary, Hypoplastic	Absent
Renal abnormalities	Absent	Absent	Unilateral agenesis, Malposed kidneys	Absent	Uncommon	Dysplasia

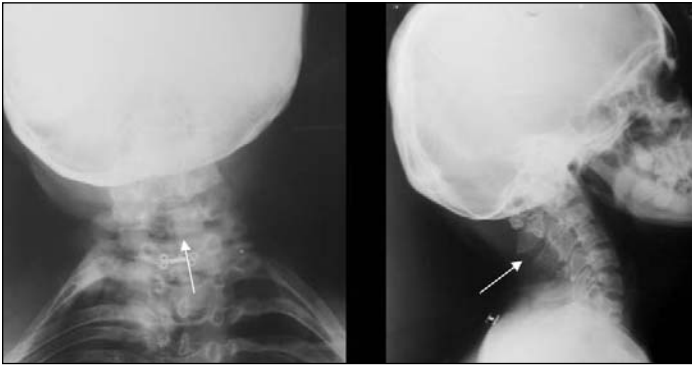


Figure 7. Cervical spine AP view showing partially fused T4 & T5 and lateral view showing fusion of C3 & C4 posteriorly (arrows).

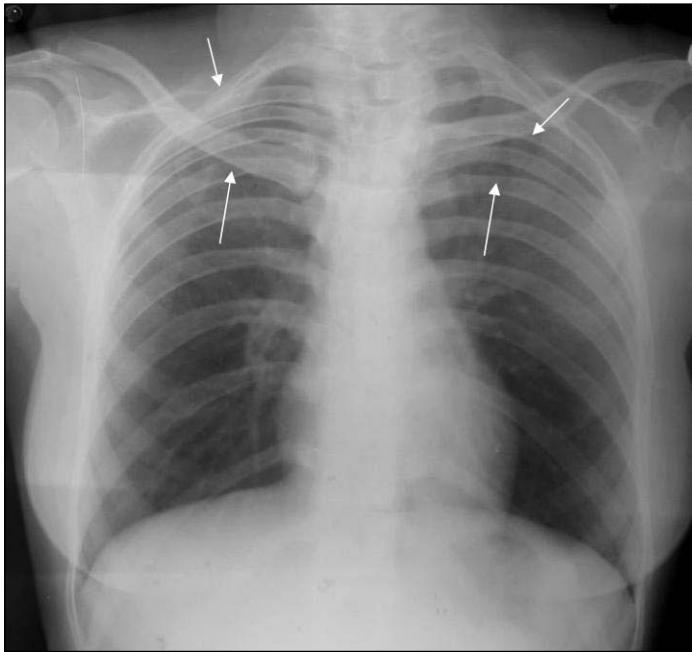


Figure 8. Chest X-ray showing crowding of ribs (arrows).

modalities available, especially during pregnancy, and has proved its efficiency in the prenatal diagnosis of HFM. Hattori et al.¹⁵ reported a case where the ultrasonographic evidence of ventricular septal defect (VSD) and right orbital hypoplasia and hemiatrophy of the nose was later confirmed with a fetal MRI.

Various authors in their studies have reported that this group of patients present with tooth agenesis.¹⁶ Maruko E¹⁷ et al. reported that hypodontia was more prevalent in patients with HFM than in normal subjects and hypodontia was more prevalent with increasing severity of the mandibular deformity.

Farias et al.¹⁸ opined that the incidence of missing teeth is higher in this group compared to normal subjects. Also, that tooth development is frequently delayed on the affected side and that the mandibular third molar is missing more frequently on the affected side compared to the unaffected side. With these dental manifestations in view, Case One presented with multiple missing posterior teeth with generalized bone loss. Although the missing teeth were observed in both the right and left quadrants, the possibility of

hypodontia on the affected side cannot be ruled out completely.

By contrast, in Case Two, there was no obvious dental manifestation present, probably indicating less severe extent of the disease.

The role of differentiating a particular condition from a syndrome with overlapping characteristics is important not only from the management perspective but also to gain insight into the inheritance pattern. The characteristic features of HFM spectrum are distinguishable from mandibulofacial dysostosis, maxillofacial dysostosis, Nager acrofacial dysostosis and post-axial acrofacial dysostosis. A facial involvement in the HFM spectrum is usually asymmetric, with one site of the face involved more severely. Furthermore, there is far less hypoplasia of the malar bones present. Complete or partial absence of the lower eyelashes has been reported in HFM. Pre-auricular tags rarely occur in mandibular facial dysostosis. Colobomas in HFM affect the upper eyelid, where, as in mandibulofacial dysostosis and nager acrofacial dysostosis, the notch is in the outer third of the lower eyelid¹² (Table 3).

The management of HFM requires a multidisciplinary approach, which includes psychological counseling, orthodontic intervention in younger patients, surgical correction and prosthetic rehabilitation. The management of these patients depends upon the severity of the deformity and also the age at which the patient reports to the clinician.

The treatment options for dento-facial deformities like HFM outlined by Bruce Epker depend upon the severity of presentation (based on Kaban's modification of the Pruzansky's classification).¹⁹

Children with mild dento-facial deformities are best treated after the pubertal growth spurt. Orthodontic treatment of the occlusal correction is best done after eruption of all the permanent teeth. The remaining mild facial asymmetry is addressed with advancement/straightening genioplasty and/or unilateral mandibular augmentation after facial growth is completed. Though functional appliances have not been shown to produce clinically relevant improvement of facial growth in these patients,¹⁹ Silvestri et al.²⁰ advocate the use of asymmetrical functional activator in growing children in S1-S2/T2 cases (patients classified using the SAT classification). The surgical modalities include distraction osteogenesis and ramus osteotomy with/without bone grafting.¹⁹

In children with mild-to-severe dento-facial defects, the treatment is divided into two phases. The first consists of distraction osteogenesis and unilateral ramus osteotomy with bone grafting. The second phase consists of esthetic surgical procedures in conjunction with additional orthodontic treatment and orthognathic reconstructive surgery. For patients who report after completion of active facial growth, the treatment options include esthetic reconstructive surgery, which includes a combination of mandibular bony augmentation, genioplasties, facial soft tissue augmentation, auricular reconstruction and malar orbital reconstruction, followed by the usual orthodontic surgical approach.¹⁹

In cases of severe dento-facial deformities with extensive agenesis of the mandible, reconstruction of the involved structures, usually using the iliac rib, has been advocated. The placement of a

costochondral graft abutting to the existing glenoid fossa is preferred over reconstruction of the glenoid fossa.¹⁹

Keeping in mind the degree of deformity, both of our patients were told about the treatment options available to them. But because of financial constraints, they preferred not to undergo the planned treatment.

Conclusion

HFM presents clinically with characteristic features, although, in a small percentage of cases, there might be mild overlapping features of other conditions. The other closely related conditions include mandibulofacial dysostosis, maxillofacial dysostosis, Nager acrofacial dysostosis and post-axial acrofacial dysostosis. It is the clinician's responsibility to identify and treat the condition during the early stages for better esthetics and the psychological benefit of the patient.

Most of the reports on the management of HFM have been outlined here to describe only dento-facial deformities. There is no effective treatment for the extracranial defects; hence, strong emphasis needs to be placed upon prenatal diagnosis and counseling. ■

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Parental Perceptions about Children's Oral Health Care and Toothpaste in New York City Neighborhoods

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Abstract

The American Academy of Pediatric Dentist, the American Association of Pediatricians and the Centers for Disease Control have guidelines to ensure that children are not exposed to excessive amounts of fluoride. In this study, we explored parents' knowledge and behavior regarding toothpaste and oral health care for their children. A total 613 questionnaires were collected. Many of the parents surveyed were knowledgeable. However, we still have a lot of work to do in order to provide parents with sound, reliable education about the risks and benefits of fluoridated toothpaste.

SINCE THE 1940s, it has been accepted that fluoride can decrease cavities; and its use has been part of a major public health care initiative to decrease caries. Research has shown that brushing with toothpaste that contains fluoride lowers the risk of decay by 15% to 30%; and drinking fluoridated water lowers the risk by 18% to 40%.

Exposure to fluoride comes from fluoridated water, reconstituted baby formula with fluoridated water,¹ soft drinks, certain foods, dentifrices (toothpaste), mouthrinses, topical fluoride solutions and gels, oral supplements and professional varnish application. Unfortunately, this has led to an increase in the prevalence of dental fluorosis. The Centers for Disease Control (CDC) found a 9% higher prevalence of dental fluorosis in American children than

was found in a similar survey 20 years ago.² This increase in the prevalence of fluorosis has been found not only in fluoridated communities but also in non-fluoridated communities.^{3,4}

Many children begin brushing their teeth before the age of 2.⁵ Simard et al. proposed that most children begin to use fluoride dentifrice by the age of 18 to 24 months.⁶ Wyne et al. also found that brushing commenced, on average, between 6 and 24 months for 84.5% of his study population.⁷ This is right around the time when teeth are most vulnerable to fluorosis. The American Academy of Pediatric Dentistry (AAPD), the American Dental Association (ADA), as well as the CDC, recommend using a "pea size" amount of fluoridated toothpaste to reduce the risk of fluoride ingestion and decrease the chances of fluorosis in these young children.

"Children under the age of 6 years can swallow up to 25-33% of the fluoride toothpaste used at each brushing because their swallowing reflex is not fully developed."⁸ The CDC recommends that parents, "brush your child's teeth twice a day until your child has the skill to handle the toothbrush alone," and to continue to "supervise them to make sure the child is doing a thorough job and only using a small amount of toothpaste."⁹ A study in Adelaide, Australia, reported on the toothbrushing practices of 2 to 3 year olds. Not surprisingly, they found that "the level of supervision in tooth brushing was below that which is recommended" for this age group.¹⁰

Moreover, the size of a "pea" can be very different to different people from different cultures and is open to interpretation. Many advertisements for toothpaste promote the use of toothpaste that covers the entire toothbrush, even though the written directions for use may actually say to use only a pea-size amount. "As an example

(of toothpaste use), a strip of toothpaste containing 1,000 parts per million of fluoride and covering the brush head contains fifteen-times the amount of fluoride (than) a blob of paste of one-third the length at a concentration of 200 ppm of fluoride.¹¹ Naccache et al. found that the overall mean fluoride ingestion was 0.23 mg F from 0.21g of 1,100 ppm fluoride paste ingested by children ages 2 to 7.¹²

The CDC states that children should have no more than 0.25 mg F/day for 6 months to 3 years old, and 0.50 mg F/day for 3 to 6 year olds.¹³ The above data suggests that brushing a 2 year old's teeth twice a day will expose that child to 0.46 mg F/day (0.23 mg F/day times 2). Clearly, brushing 2 year olds with 1,100ppm F toothpaste twice a day brings them over the limit of 0.25 mg F/day. This is almost double the allowable limits for children in areas with non-fluoridated water, especially when their teeth are most susceptible to fluorosis. This does not account for all the fluoride that children in fluoridated communities imbibe on top of ingestion from brushing with fluoridated toothpaste.

In the United States, fluoridated toothpastes make up 95% of the market. Also, there are flavored toothpastes marketed for children that tend to increase the amount used—presumably, this increases the ingestion of fluoride.¹⁴ In a study by Levy et al., preschoolers used a daily average of 0.81g of toothpaste flavored for children versus 0.66g of regular flavor toothpaste.¹⁵

Also, there is evidence showing that oral health care literacy is poor among parents.^{16,17,18} Many parents do not know when to start brushing their children's teeth and when to start adding dentifrice to the routine. Many parents use toothpaste incorrectly, or may use more than the suggested amount of toothpaste.

Methods

Institutional Review Board approval was granted by Mount Sinai Hospital for the questionnaire. A cross-sectional, anonymous, self-administered questionnaire was given to parents, relatives or legal guardians of children ages 0 to 18 years of age. The questionnaire was given out in Head Start programs, pediatricians' offices and clinic waiting rooms. These different sites were chosen to get a cross-section of society from different socio-economic, educational and ethnic backgrounds.

The questionnaire asked the adults who had children ages 0 to 18 years of age about supervision during toothbrushing, toothpaste and mouthrinse use, how often their children brush, toothbrush size, brushing and spitting behaviors, fluoride knowledge, eating and drinking behaviors, water knowledge and use, dentist/pediatrician's involvement with the child's oral health, knowledge of oral health care, when the child commenced brushing his or her teeth, if he or she ever went to or had a dentist and barriers to oral health care. Most questions were on a 4-5 point Lickert Scale. There were some questions with free text optional answers. There was a section for demographics toward the end of the questionnaire.

The questionnaire consisted of 24 questions on two typed pages, in English and Spanish. It was conducted in and around the Bronx, Washington Heights, East Harlem and the Upper East Side of

Manhattan. A toothbrush was given as an incentive to the adult who agreed to fill out a questionnaire. Also, a CDC pre-made pamphlet on oral health care for children was handed out afterward to help educate parents about oral health care for their children. All data was entered on a spreadsheet and stored in a password-protected computer.

A total of 613 questionnaires were collected, giving a confidence level of 95% and yielding a confidence interval of 4. Analysis was carried out using SPSS 12.0 software system for Windows. Descriptive statistics for each of the questions were obtained. The Chi-square test was used to test the correlation between pea size and the amount of toothpaste placed on a toothbrush using recorded numbers combining the largest size with the medium-large

TABLE 1
Study Demographics

	Frequency	Percent
Age Distribution (years) (n=602)		
<=3.0	233	38.7
3.01-4.00	228	37.9
4.01-5	66	11
5.01+	75	12.5
Sex (n=613)		
Male	300	48.9
Female	303	49.4
Missing Information	10	1.6
Child's Ethnicity (n=590)		
Asian or Pacific Islander	15	2.5
Black, not Latino origin	106	18
Latino	397	67.3
White, not Latino origin	62	10.5
Other	10	1.7
Annual Family Income (\$) (n=490)		
<14,999	202	41.2
15,000-24,999	132	26.9
25,000-34,999	60	12.2
35,000-45,000	25	5.1
>45,000	71	14.5
Have Dental Insurance (n=589)		
Yes	510	86.6
No	79	13.4
Have Health Insurance (n=595)		
Yes	567	95.3
No	28	4.7
Parent's Level of Education (n=546)		
<8 years	43	7.9
Partial High School	71	13
High School Completed	164	30
Partial College/Tech School	124	22.7
College Graduate	144	26.4

size to achieve the minimum expected cell frequency of 5. This way no assumptions were violated.

Results

Study Demographics

Study demographics are displayed in Table 1. The median age of the children surveyed was about 4 years old; standard deviation was 2.64. The children's ages were grouped so that 38.7% of the children

were younger than 3, 37.9% were 3 to 4 years of age, and all others were older than 4. The sample (n=613) was composed of approximately one-half boys and one-half girls. A large portion of the population (67.3%) was of Latino origin; 18% of the sample was black; 10.5% white; and 2.5% Asian. Thirty percent of the population had completed high school; 26.4% completed college; 22.7% completed partial college or technical school education; 13% had partial high school education; and 7.9% completed less than eight years of school. Also, 41.2% of the families had an annual income less than \$14,999; 86.6% of the families had dental insurance; and 95.3% of the families had health insurance.

Oral and Brushing Behaviors

The parents were surveyed on their child's oral/brushing behaviors (Tables 2, 3, 4). It was noted that 63.5% of the children brushed their teeth twice a day. There were 58.9% of the children using Colgate toothpaste, and 89.9% used a child's size toothbrush. Also, 54.7% of the children always brush their teeth with fluoridated toothpaste. The data collected indicated that 46.5% of the children never swallow the toothpaste, and 59.6% always spit out the toothpaste. Many of the children (56.0%) drink juice as their primary beverage consumed. Moreover, 70% of the parents always watch their children brush their teeth. Of those surveyed, 68.4% did not notice any white spots on the front surface of their children's teeth.

Parent's Knowledge of Oral Health Care

Table 3 shows parent's knowledge of oral health care. It was discovered that 70.5% of the parents said children's toothpaste is less harmful to a child; 66.8% of the parents responded that brushing should commence at 1 year of age; and 40.3% of the parents said a child should first see a dentist at the age of 2. Many of the parents (76.0%) chose the smallest circle on the survey to be the size of a pea, while 50.7% of the parents chose the toothbrush with the smallest amount of the bristles covered to be the amount that should be placed on a toothbrush (Appendix 1).

Parent's Behavior Regarding Oral Health Care

Table 4 shows parent's behavior regarding oral health care. When asked if a health care professional has taught them brushing techniques for their children, 31.8% of the respondents answered "always."

A Chi-square test was used to test the correlation between pea size and the amount of toothpaste placed on a toothbrush. The associated significance level is 0.000 (2-sided), which is significant. It was noted that 52.5% of the population thought the toothbrush with the smallest amount on it was the amount that should be placed on the toothbrush; and 44.6% of them actually knew what a pea size was. 31.7% thought that the small-medium amount of toothpaste on the toothbrush was the right amount that should be placed, but only 22.3% knew what a pea size was. The Pearson correlation was 0.160 (sig. 0.001 2-tailed).

TABLE 2
Child's Oral/Brushing Behavior

Times/Day Brush Teeth	Frequency (n=602)	Percent
1	94	15.6
2	382	63.5
3	93	15.4
More than 4	8	1.3
Don't know	25	4.2
Brand of Toothpaste Used at 2 Years Old		
	(n=599)	
Aquafresh	37	6.2
Colgate	353	58.9
Crest	82	13.7
AIM	17	2.8
None	20	3.3
Don't know	24	4.0
Other	66	11.0
Size Toothbrush Used		
	(n=597)	
Children's	537	89.9
Adult	45	7.5
No difference	10	1.7
Don't know	5	0.8
Beverage Mostly Consumed		
	(n=609)	
Soda	33	5.4
Juice	341	56.0
Water	151	24.8
Milk	84	13.8
Age Child First Time with Dentist/Dental Hygienist		
	(n=580)	
At Birth	73	12.6
1 year old	119	20.5
2 year old	149	25.7
3 year old	119	20.5
4 year old	28	4.8
Not yet	92	15.9
# of Front Teeth with White Spots		
	(n=595)	
1	21	3.5
2	45	7.6
3	13	2.2
4 or more	19	3.2
None	407	68.4
Don't know	90	15.1

TABLE 3
Parent's Knowledge

	Frequency (n=471)	Percent
Size of a Pea		
Smallest	358	76.0
Small Medium	78	16.6
Medium Large	25	5.3
Large	10	2.1
Amount of Toothpaste on Brush		
	(n=576)	
Smallest	292	50.7
Small Medium	185	32.1
Medium Large	75	13.0
Large	24	4.2
Age to Start Brushing Teeth		
	(n=584)	
1 year old	390	66.8
2 year old	154	26.4
3 year old	34	5.8
4 year old	4	0.7
Older than 5 years	2	0.3
Age Child Should First See Dentist		
	(n=593)	
1 year old	170	28.7
2 year old	239	40.3
3 year old	146	24.6
4 year old	30	5.1
Older than 5 years	8	1.3
Less Harmful Toothpaste to Child		
	(n=586)	
Children's	413	70.5
Adult	43	7.3
No difference	63	10.8
Don't know	67	11.4

Discussion

A major part of oral health care is learning when and how to brush properly and proper use of just the right amount of toothpaste. Only 31.8% of the respondents in our survey answered "always" to the question whether a pediatrician or dentist ever showed them how to properly brush their child's teeth; 28.4% answered "sometimes." This shows that a large group of parents never received clear instruction on how to care for their children's teeth.

Many parents start using toothpaste containing fluoride on their children's toothbrush well before the age of 2. Osuji and colleagues reported that children who began brushing their teeth with fluoridated toothpaste between the ages of 6 and 24 months were at an 11-times greater risk of developing dental fluorosis than children who did not begin brushing before age 24 months.²⁰

In a study by Franzman et al., it is suggested "that children should use dentifrice carefully and also, they should use only a pea-sized amount, particularly at about 24 months of age."¹⁹ As a result of these recommendations, the questionnaire contained a question to assess whether parents knew what a pea size was by having four different size circles representing peas. 76.0% of those who answered correctly chose the smallest circle as the size of a pea (Appendix 1).

As mentioned previously, most of the toothpaste made for children has the same amount of fluoride as that found in adult tooth-

paste, usually around 1,100 parts per million. This is a very high dose for small children, especially when a large amount is swallowed rather than being spit out. The only difference in children's toothpaste when compared to adult toothpaste is the variety and types of fruity flavors that are made specifically to aid in their appeal to children. These flavors make the toothpaste more palatable. However, the child is also more apt to swallow the toothpaste rather than spit it out.

Mascarenhas states that "children under the age of 6 years can swallow up to 25-33% of the fluoride toothpaste used at each brushing because their swallowing reflex is not fully developed."⁸ In our survey, 40.5% of parents responded by saying, sometimes their child swallows the toothpaste. A full 59.6% claimed that their child always spits out the toothpaste used, and another 31.5% of the children sometimes spit out their toothpaste.

However, available research tells a different story. Children will attempt to do as they are told or, possibly, they mimic what their parents show them and attempt to spit out as much toothpaste as they can. In any event, they are making it look like they are spitting out their toothpaste. However, it is well documented that young children do not have the capacity to spit out all their toothpaste.⁸ This is something that develops over time, when muscles and nerves are more mature and have the capacity to accomplish this task.

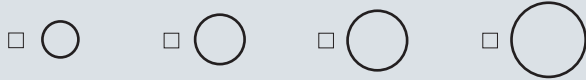
Available studies have shown that children under the age of 6 swallow large amounts of toothpaste. This was ascertained by measuring the amount of toothpaste placed on a toothbrush and what was retrieved after brushing with the toothbrush.²¹ Parents really have no accurate way of knowing how much toothpaste their child is swallowing or just how much they are spitting out.

TABLE 4
Parent's Behavior

	Always freq(%)	Sometimes freq(%)	Never freq(%)	Don't Know freq(%)
Child Brushes with Fluoridated Toothpaste (n=585)	320(54.7)	150(25.6)	45(7.3)	70(11.4)
Child Swallows Toothpaste (n=600)	52(8.7)	243(40.5)	279(46.5)	26(4.3)
Child Spits Out Toothpaste (n=594)	354(59.6)	187(31.5)	45(7.3)	8(1.3)
Parent Watches Child Brush Teeth Start to Finish (n=597)	418(70.0)	146(23.8)	28(4.6)	5(0.8)
Dentist/Pediatrician Taught Brushing Technique (n=591)	188(31.8)	174(28.4)	209(35.4)	20(3.4)

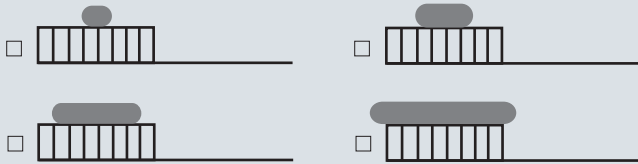
Appendix 1 Survey Questions

12) Which one of the best describes the size of a pea?



Don't know

13) How much toothpaste should be placed on the toothbrush of a child younger than 6 years old?



Don't know

Seventy percent of the parents answered the survey by saying that they always watch their child brush his or her teeth; 23.8% said sometimes they did. In this hectic world, where often both parents have to work, it is difficult to believe that so many of the respondents were able to find the time to watch their children brush their teeth. Most likely, parents did not answer this question honestly and with full disclosure. It seems that most respondents answered this question with what they thought should be the “correct” response.

Moreover, using the Chi-square test and Pearson correlation, it is noted that there was a correlation between respondents who chose the smallest circle and the amount of toothpaste parents actually thought should be on their child’s toothbrush. In essence, many people accurately know what “pea size” is, but this amount of toothpaste is not what they actually put on the toothbrush.

Conclusion

Our study results provide meaningful insight into the knowledge base and perceptions of parents regarding their children’s dental care and oral hygiene. Almost half of the parents surveyed acknowledged that they had not received any formal education on how to take care of their child’s teeth from a dentist or pediatrician.

Water has been supplemented with fluoride in most urban areas since the 1950s, and its beneficial health affects have been widely recognized. Adding fluoride to toothpaste became a common practice in the late 1970s. Today’s young adults, those in their 20’s, are the ones who you will see exhibiting the ill affects excessive fluoride use, which dates back to their early childhood. Often, parents of these young adults are not bothered by the white spots on their children’s teeth.²² But today’s society places high value on perfectly white teeth, as evidenced by all the products being marketed for teeth whitening.²³

Many of the parents surveyed were knowledgeable. However, we still have a lot of work to do in order to provide parents with sound, reliable education about the risks and benefits of fluoridated toothpaste. This may help decrease the amount of fluorosis that is now being seen in young children. ■

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Enamel Bond Strength of Self-Etch Sealant with and without Prior Acid Etching

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Abstract

Our study was undertaken to evaluate the bond strength (BS) of a self-etch sealant to enamel and to determine the effect of prior enamel conditioning with phosphoric acid. Lingual surfaces of permanent human molars were mounted in copper rings and assigned to five groups: Group 1, Clinpro (control); Group 2, Enamel Loc; Groups 3, 4, 5, Enamel Loc with prior phosphoric acid etching of enamel for 5, 10, 15 seconds, respectively. Sealants were applied and BS measured. Clinpro showed significantly higher BS than Enamel Loc. Prior enamel etching for 10 and 15 seconds improved BS of Enamel Loc.

THE EFFECTIVENESS of dental sealants in primary and secondary (early noncavitated lesions) caries prevention has been well documented.¹ Sealants provide a physical barrier to plaque and microorganisms in pits and fissures of molars and premolars.^{2,3} Studies show that resin-based sealants, which require prior acid etching of the tooth surface, are more effective than glass ionomer cements in caries reduction 24 to 44 months after placement in permanent teeth of children.^{4,5} However, their long-term retention depends upon their bonding effectiveness and proper placement.

Sealant application typically includes: 1. cleaning pits and fissures; 2. appropriately acid etching the tooth surfaces; and 3. isolat-

ing the surface to prevent contamination with saliva until the sealant is placed and polymerized. A new self-etch sealant eliminates the technique-sensitive steps (acid etching, rinsing and drying), thus, simplifying the application procedure. This is an important feature of the self-etch sealant, which may provide an attractive alternative to the standard acid-etch technique for sealant application, particularly for children who because of their age, behavioral problems, dental phobia, strong gag reflex or disability are unable to cooperate.^{9,10}

Existing studies on techniques to improve retention of pit-and-fissure sealants have focused on the use of adhesive materials as an intermediary layer between etched enamel and resin sealant. This approach has been found to equal the success obtained with standard phosphoric acid-etch technique.⁶ Other studies have investigated self-etching primers/adhesives to simplify the steps of the sealant procedure and have found varying results when compared to the standard phosphoric acid-etch technique.^{7,8}

Currently, there are no published studies of the bond strength of self-etch sealants. Since enamel bonding is primarily based on micromechanical interlocking into micro-porosities created by acid-etching of the enamel surface,¹¹ these studies are needed to determine the effectiveness of the self-etch process. A bond strength that is greater or equivalent to that obtained with the standard acid-etch technique could justify the use of a self-etch sealant in the pediatric population.

The purpose of this in vitro study was to determine the shear bond strength of a new self-etch sealant material (*Enamel Loc, Premier Dental, Plymouth Meeting, PA*) to enamel and to investigate the effect of

prior phosphoric acid etching of the enamel surface for 5, 10 and 15 seconds. Adequate bond strength was defined as equivalent to the bond strength established for the standard 20-second acid-etch technique for placement of the conventional sealant Clinpro (3 M ESPE, St. Paul, MN).

Materials and Methods

Seventy-five noncarious extracted human premolars were debrided and stored in 0.5% chloramine solution at 23°C. The roots were sectioned at the cemento-enamel junction with a low-speed, water-cooled diamond saw (Buehler, Lake Bluff, IL, USA). The crowns were individually embedded in copper ring (30 mm diameter x 12 mm) using Type III Dental Stone to expose a flat lingual enamel surface. Each specimen was cleaned with follows, fluoride-free pumice slurry and a white rubber cup, rinsed and air dried. To demarcate the bonding site, a piece of insulating tape with a 3 mm diameter hole, made with an Ainsworth rubber-dam punch, was placed on the specimen surface.

The specimens were divided into five groups and bonded with sealant materials (Table 1) as follows:

- Group 1 – Clinpro sealant (control group).
- Group 2 - Enamel Loc self-etch sealant.
- Group 3 - Enamel Loc self-etch sealant following 5 seconds etching with 37% phosphoric acid (Scotchbond Etching Gel, 3M ESPE, St Paul, MN).
- Group 4 - Enamel Loc self-etch sealant following 10 seconds etching with 37% phosphoric acid.
- Group 5 - Enamel Loc self-etch sealant following 15 seconds etching with 37% phosphoric acid.

A plastic cylindrical tube was placed over the exposed flat enamel surface. The tubes were then filled with the sealant using a 30 x 7-gauge needle, according to the manufacturers' instructions.¹² The material was light cured for 20 seconds with a visible light-curing unit (Model No.100, Dentsply International, York, PA). The specimens were stored at 37°C in 100% humidity for one week.

Shear bond strength was measured using a Universal Testing Machine (Instron, Canton, MA) running at a crosshead speed of 0.5 mm/min. The data were compared using Kruskal-Wallis ANOVA, followed by pair-wise multiple comparisons using Dunn's Method.¹³ A P value of <.05 was used to determine significant differences.

TABLE 1
Materials Used

Material	Clinpro	Enamel Loc	Scotchbond phosphoric acid gel
Type	Unfilled resin-based sealant, Light-cured	Self-etch sealant, Light-cured	Acid gel
Manufacturer	3M ESPE, St. Paul, MN	Premier Dental, Plymouth Meeting, PA	3M ESPE, St. Paul, MN
Batch number	12627	4123QSSE	4009050

TABLE 2
Statistical Analysis of Shear Bond Strength of Sealants to Enamel
Kruskal-Wallis One Way Analysis of Variance on Ranks
Pairwise Multiple Comparison using Dunn's Method

Comparison	Diff of Ranks	Q	P<0.05
Clinpro vs Enamel Loc SE	41.14	6.04	Yes
Clinpro vs Enamel Loc with 5 sec. etch	21.09	3.03	Yes
Clinpro vs Enamel Loc with 15 sec. etch	16.82	2.42	No
Clinpro vs Enamel Loc with 10 sec. etch	14.64	2.11	No
Enamel Loc with 10 sec. etch vs Enamel Loc SE	26.50	3.89	Yes
Enamel Loc with 10 sec. etch vs Enamel Loc with 5 sec. etch	6.46	0.93	No
Enamel Loc with 10 sec. etch vs Enamel Loc with 15 sec. etch	2.18	0.31	No
Enamel Loc with 15 sec. etch vs Enamel Loc SE	24.32	3.57	Yes
Enamel Loc with 15 sec. etch vs Enamel Loc with E 5 sec. etch	4.27	0.61	No
Enamel Loc with 5 sec. etch vs Enamel Loc SE	20.05	2.94	Yes

For all Clinpro samples, enamel was etched with 37% phosphoric acid for 15 seconds.
For Enamel Loc self-etch (SE) samples, the sealant was applied using the self etch feature.
Etching of enamel for Enamel Loc was performed with 37% Phosphoric Acid.

Results

Figure 1 shows bond strength of sealant materials to enamel. The conventional sealant, Clinpro, showed a higher bond strength to enamel (p<.05) than the self-etch sealant, Enamel Loc. Prior conditioning of the enamel surface with 37% phosphoric acid improved the bond strength of the self-etch sealant. The highest bond strength for the self-etch sealant was obtained when the enamel was etched for 10 seconds, but this value was not significantly higher than the bond strength obtained after 5 or 15 seconds of acid-etching. There was no significant difference between the bond strength of Clinpro to enamel and Enamel Loc to enamel following 10 and 15 seconds of acid-etching. The statistical comparisons are shown in Table 2.

Discussion

Since the effectiveness of pit-and-fissure sealants in caries prevention depends on long-term clinical retention, bonding to enamel is critical. The bond strength of a new self-etch sealant must be comparable to, or better than, that of established conventional materials to be truly advantageous. The results of this investigation show that the standard acid-etching technique prior to application of the new self-etch sealant, Enamel Loc, provides stronger bond strength than the new self-etch sealant material alone.

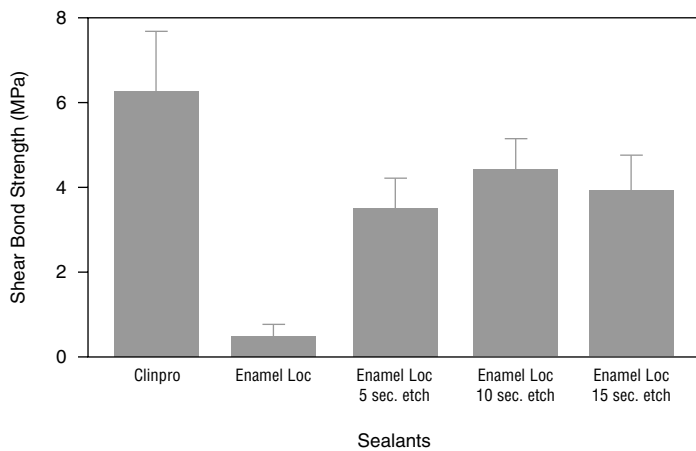


Figure 1. Shear Bond Strengths of Self-Etch Sealant (Enamel Loc) to Enamel with and without Prior Phosphoric Acid Etching. Conventional sealant (Clinpro) was used as control.

While there is no established minimum bond strength value for a sealant to be effective, the values obtained for the self-etch sealant in this study appear significantly lower than the conventional sealant. Conventional pit-and-fissure sealants are retained on primary molars at a rate of 71% to 77% at 2.8 years.^{14,15} The retention rate of self-etch sealant would be expected to be lower and, therefore, would require frequent replacement compared to conventional sealant.

The bond strength of the self-etch sealant can be improved by prior conditioning of the enamel surface with phosphoric acid. In this study, prior etching of enamel improved the bond strength of the self-etch sealant significantly. Etching for 10 seconds improved the bond strength by 800% to levels comparable to conventional sealants. There was no statistically significant difference among the etch times. This step is, therefore, recommended for effective use of the self-etch sealant. Since even a five-second etch improves the bond strength significantly, procedure time may be reduced by using this technique.

Retention of resin-based sealants is a micromechanical process through resin tags interlocking into microporosities in enamel.¹⁶ The microporosities are created by selective dissolution of hydroxyapatite crystals in enamel by 30% to 40% phosphoric acid. It appears that the self-etch sealant behaves as a “mild” enamel etchant. Similarly, adhesives categorized as “mild” self-etching systems have been reported to have weak bond strength to enamel.¹⁶ The results of this study show that a separate etching step improves the bonding to enamel. This finding is in agreement with other investigations of self-etch bonding agents, which demonstrates that elimination of the separate etching step may lead to less retention than the standard-etching technique.^{7,8}

The development of a self-etch sealant or single-step placement approach holds promise in dental caries prevention, particularly among children at high risk for developing caries. They include children in low-income groups and those who because of age, behavior, strong gag reflex or disability are unable to cooperate fully for multiple-step procedures.

However, self-etch sealants with improved etching of the enamel surface are needed to realize the benefits associated with a simplified application procedure for pediatric populations.

Although in vitro studies do not reflect all the variables present in the in vivo situation, this study provides comparative values of bond strength that should guide selection of materials and techniques.

Conclusions

The following conclusions can be made within the context of this in vitro study:

- Conventional resin-based sealant bond strength to enamel surface was significantly higher than that of self-etch sealant.
- Enamel shear bond strength of evaluated self-etch sealant can be increased significantly by additional phosphoric acid etching.
- Prior etching of the enamel surface with 37% phosphoric acid for a minimum of 10 seconds improved the shear bond strength of the self-etch sealant to levels comparable to a conventional resin-based sealant. ■

Queries about this article can be sent to Dr. Wadenya at wadenya@dental.upenn.edu. The study was originated, designed and reported by Dr. Wadenya and Dr. Mante, with substantial input from Dr. Herrera. Jennifer Smith assisted with the preparation of samples and data collection. All authors helped in the interpretation and review of drafts of the manuscript.

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