JCDA
Journal of the Canadian Dental Association

Vol. 70, No. 3 March 2004

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Mission statement

CDA is the authoritative national voice of dentistry, dedicated to the representation and advancement of the profession, nationally and internationally, and to the achievement of optimal oral health.

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DEBATE

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Editorial

NOTHING TO DECLARE?

Dr. John P. O'Keefe

Concern about acquiring communicable diseases is ever present in health care, both for providers and patients. This was highlighted recently when a Montreal surgeon who worked in a children's hospital died of HIV-related illnesses. She had seemingly acquired the infection while performing a surgical procedure many years before.

The media were all abuzz with the case, as the hospital attempted to contact over 2,600 patients operated on by the surgeon, in order to carry out HIV blood testing on them. Over 10,000 people called the hospital, enquiring if they might require blood testing, surely a measure of the anxiety generated by the story.

The angle that the media played up was that the physician informed her professional colleagues of her health status, but that the medical authorities hadn't informed the hospital administration about it. Was this a breach of trust on the part of the professionals, and should the administration have been informed? Perhaps if the administration had known, restrictions might have been placed on the working practices of the surgeon. Should the public have been informed?

I couldn't help thinking as I listened to this story unfolding in the media that the possibility of one of the patients proving to be HIV positive as a result of surgery at the hands of the deceased surgeon must really be minimal. Yet, to manage risk effectively, the hospital had to be seen to be pulling out all the stops to ensure that no patient was infected, no matter how low the risk of transmission.

The risk of such transmission appears to be extremely low in dental practice. According to the recently published *Guidelines for infection control in dental health care settings - 2003*, produced by the U.S. Centers for Disease Control and Prevention (CDC), there has been no reported case of HIV transmission from a dental care worker to a patient since 1992. The last reported transmission of hepatitis B to a patient was in 1987, and there has never been a report of hepatitis C being transmitted to a patient in a dental office.

Is this because of the widespread adoption by dental personnel of standard precautions (the term CDC now uses instead of "universal precautions")? Or is it because of an inherently low probability of transmission in the dental care setting? These are of course very difficult questions to answer, but notwithstanding, our profession maintains a strong commitment to the best infection control practices.

As part of that commitment, I recommend that you consult the above-mentioned CDC document for the latest information in this area of fundamental importance to your practice (http://www.cdc.gov/mmwr/PDF/rr/rr5217.pdf).

Table 1 deals with the thorny issue of suggested work restrictions for health workers afflicted with a variety of infectious diseases, including HIV. So what should I do if I become HIV positive? As I am registered in Ontario, I turned to the Web site of the Royal College of Dental Surgeons of Ontario (RCDSO) for guidance. In the *Dispatch* newsletter of Winter 2000 (http://www.rcdso.org/dispatch/Dispatch14_1.pdf), my course of action is laid out clearly.

It is my ethical responsibility to be aware of my serological status with regard to bloodborne pathogens. It is also incumbent upon me to inform the RCDSO if I become HIV positive, because that condition could potentially impact on my ability to practise safely. If I do declare myself, RCDSO assures me that they will deal with my case in total confidentiality and fairness. An expert panel will be set up, which will include my personal physician. Taking a range of evidence into account, this panel will advise and counsel me on whether I should restrict my practice in any way.

Naturally, I would be fearful of losing my livelihood and more, but I would have to deal with my conscience if I didn't act in a manner that my peers consider responsible. I would feel obligated to report my condition and place my trust in the experts. If my dental regulatory authority or govenment requires me to limit my practice and I lose more than 20% of my income, Canadian Dental Service Plans Inc.'s Long Term Disability Insurance will cushion the blow. What would you do?

John O'Keefe
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President's Column

TO CARE OR NOT TO CARE... THAT IS THE QUESTION

Dr. Louis Dubé

I wrote in an earlier column that I decided to become a dentist when I was in Grade 8, as I was sitting in my dentist's chair. And here I am, 30 years later — president of the Canadian Dental Association...

So what was behind this decision to become a dentist? It's quite simple, really. My dentist liked his work, enjoyed life and, above all, took care of people and made them feel better.

More and more, whether we want it or not, our practice is influenced by the media, new technology and competition between professionals. More so than ever before, today's new dentist, when starting up a practice, must find a way to stand out from the crowd. Twenty-three years ago, when I set up my practice with my partner, we stood out from the rest with our open concept COX system, and because we had a panoramic X-ray machine, which at that time was the state-of-the-art! Imagine how many impacted teeth and abnormalities, undetected by other dentists, we were able to identify in our new patients. It would be unimaginable to start a practice today without a panoramic X-ray or computer.

In our 500-channel universe, not a day goes by that a patient doesn't ask for information about teeth whitening, because he or she saw such-and-such a star on television sporting a bright white smile. Perhaps a patient came across a magazine story or newspaper advertisement or Web site touting the latest "sure thing" for replacing missing teeth.

Our main mandate is of course to meet our patients' needs. However, it is even more important to consider that we are not there to create needs, but to take care of them. The competition in our limited market sometimes makes us lose sight of this fact.

There was a time when certain business gurus were intent on applying tried-and-true sales and marketing techniques to dentistry. This trend was most pronounced in the 1980s. Patients were divided into 2 halves. "Lying down" was the patient, but "standing up" was the client. We talked about marketing strategies, sales incentives and a patient management team. This concept proved to be very popular and effective, but over time, patients, ever more informed and suspicious, began to reject this approach.

Most recently, we've noticed that patients don't want "production line dentistry." They now have more discretionary money and they know what they want. Our role no longer involves determining the needs of patients, but establishing options that meet their expectations. Once we have given the required explanations, the patient is the one who decides which treatment is best suited for him or her. Of course, we can influence choices, but only to a point. The patient has the last word.

I sincerely believe that this relationship is far healthier, since this concept brings us back to our initial role of taking care of people. There is nothing in the Hippocratic Oath that mentions marketing or money. These should not take precedence over care and ethics. I believe that dentistry is above all about taking care of people. The money we receive is a reward for a job well done, and not the purpose of our work.

Having dealt with many dentistry representatives both nationally and internationally, and being involved over the years in almost every aspect of organized dentistry, I can assure you that Canadian dentistry is one of the soundest and most innovative of professions. Let's hope it stays that way and that we continue to put our patients' interests above our own.

À la prochaine.

Louis Dubé, DMD
president@cda-adc.ca

Letters

Editor's Comment

The *Journal* welcomes letters from readers about topics that are relevant to the denta profession. The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the Canadian Dental Association. Letters should ideally be no longer than 300 words. If what you want to say can't fit into 300 words, please consider writing a piece for our Debate section.

Amalgamating Dentistry and Medicine

I spent a year as acting dean of the College of Medicine here at the University of Saskatchewan and am fully aware of the advantages of the merger of the 2 Colleges and that these *absolutely* outweigh any disadvantages, yet to be documented by my detractors.[1] I also suspect that the premise of "quality fee-for-service private practice" as the *only* outcome of a dental degree is false and may be one of the contributing factors to the lack of access to oral health care among citizens who find themselves without a third-party plan and whose income is less than adequate.

Dr. Charles G. Baker
Saskatoon, Saskatchewan

Reference

1. Thompson A. Amalgamating dentistry and medicine. Letter. *J Can Dent Assoc* 2004; 70(1):13.

Dental Treatment for Elders

After reading the Sperber and Yu article on endodontic treatment for elderly patients,[1] I might add that patient age should not contraindicate *other* dental treatment. The following anecdote illustrates this point.

When I was in third-year dental school in 1978, my patient Harold McKay, a retired cooper for a distillery, was strangely reluctant to get new full dentures. Upon enquiry, he said that he was 74 and, since that was 4 years past the then-average lifespan for a male, he wondered if new dentures would be a waste of money. The next week, I brought in an almanac and showed him actuarial tables indicating that, with his present age and health, he still had (on average) 8 years of life ahead of him. Harold was delighted and happy to get his dentures.

Not only did Harold live for 8 more years, he is still going strong as he approaches his 100th birthday in May! To celebrate this and his quarter-century friendship with me, Harold painted the picture below and gave it to me.

I hope that this tale will brighten the perspectives of other dentists and patients facing similar situations.

Dr. Carl Cramer
Vancouver, B.C.

Reference

1. Sperber GH, Yu DC. Patient age is no contraindication to endodontic treatment. *J Can Dent Assoc* 2003; 69(8):494–6.

A Diagnostic Dilemma in Dental Practice

Migratory abscess, consisting of an important group of lesions, may present itself to specialists or general practitioners, in various forms. Most abscesses are localized to the region of pathology. Occasionally, pus may track or migrate interiorly away from its point of origin, causing a secondary lesion with no pathology at the initial site. Often, such cases are misdiagnosed, and the normal vital tooth in the area of secondary lesion is sacrificed.

Recently in our clinic, a 30-year-old man in good health complained of swelling over the right side of the lower face. A week earlier, he underwent extraction of a buccally erupted, pericoronally infected lower right third molar. Three days later, an extraoral swelling appeared over the right side of the face (**Fig. 1**) near the mental foramen area — 2 × 2 cm in size. Skin over the swelling was stretched, with no signs of pointing. The extraoral swelling was diagnosed as migratory abscess from the pericoronal infection, which was present in relation to the third molar for which the tooth was extracted.

Figure 1: *Migratory abscess pointing extraorally away from the site of origin.*

The abscess was drained under local anesthesia, with incision being placed lateral to the abscess and not over the pointing area. Drainage was done under pressure and 4 ml of pus were evacuated. The swelling collapsed after drainage and extraoral pressure dressing was applied.

Clinicians should be aware of the term "migratory abscess" in dental

practice, arising from third molar periapical pathology or from pericoronitis, which can present as a well-localized abscess, pointing extraorally or intraorally away from its original site. This can result in misdiagnosis and removal of a normal tooth.

Dr. Anil George Behanan
Dr. K. M. Cariappa
Dr Garuv Jain
Karnataka, India

Professionalism Is a Way of Life

I was distressed by the *President's Column* in the October 2003 *JCDA*.[1] The phrase "Dentistry is what I am, not what I do" sends shivers up my spine. Now let it be known that being a professional is not something I take lightly. I have expressed these thoughts many times in print. Professionalism is not just a career; it is a way of life. Dentists should be aware, committed and honourable professionals. However, being a dentist is not what I *am*. What I am is a multifaceted, valuable human being, whether inside or outside of dentistry!

Anyone who has served on or been the subject of a Dentist at Risk or Fitness to Practise committee or who has known depression or loss of confidence, will shudder at the idea of total identification with a job. Any one of us can suffer the devastation of not being able to practise for any number of reasons. It would be a catastrophe, of even greater proportion, if our jobs totally defined who we were. Sometimes, the strength to carry on comes from a realization that we are the sum of all our parts. The fact that we cannot place a perfect MOD restoration or control nervous patients or remove impactions should be the impetus for introspection and reorientation of our innate strengths — not a resignation from life.

The next time someone asks, "what are you?," I hope you will proudly answer, "I'm a heck of a good human being, who is fortunate in being able to contribute meaningfully as a dentist."

Dr. Marvin Klotz
Editor, Alumni Today
Toronto, Ontario

Reference

1. Dubé L. Dentistry is what I am. *J Can Dent Assoc* 2003; 69(9):557.

President's Response

I thank Dr. Klotz for his comment on my *President's Column* of October 2003. I don't believe that he and I have any fundamental disagreement in our views about the importance of our profession to our lives. I agree that a balance between different aspects of my life is fundamental to my health and well-being. However, I am concerned with the perception, articulated by a growing number of my colleagues, that an increasing number of younger dentists seem to consider dentistry to be just a job, rather than to feel that sense of attachment and pride in being a professional that was inculcated in me when I was in dental school.

Dr. Louis Dubé

Advertisers' Index

News

Good News from Canadian Dental Service Plans Inc. (CDSPI)

More dental professionals and their families participated in the Canadian Dentists' Insurance Program plans in 2003 than in 2002. The largest increases in participation were seen in Critical Illness (up by 71%) and Term 100 (up by 46%).

Participation in the Travel plan and Legal Expense each rose by about 7%, while both TripleGuard™ Insurance and Personal Umbrella Liability plans increased by 4%.

Total participation in the Canadian Dentists' Insurance Program by dentists and dentists' corporations reached about 15,500 in 2003, up by 2% from 2002.

e-Therapeutics: Online Drug Therapy Management Tools

The Canadian Pharmacists Association (CPhA) is using an $8.8-million contribution from Health Canada's Primary Health Care Transition Fund to build the infrastructure for digital drug therapy management tools for primary health care physicians, pharmacists, nurses and others. The e-Therapeutics project will eventually provide up-to-date drug and patient safety information to primary health care practitioners at the point of care. Evidence-based support for therapeutic decision-making will also be made available.

It is claimed that e-Therapeutics will lead to a better information flow between prescriber, pharmacist and patient; the program will build on CPhA's *Therapeutic Choices*, the *Compendium of Pharmaceuticals and Specialties* (*CPS*) and *Patient Self-Care* publications. Content will be augmented with information from Health Canada.

Gene Therapy in Salivary Glands Holds Promise as Oral Disease Cure

Although gene therapy has shown much promise over the past decade, one of its major challenges is controlling the expression of a transplanted gene once it has been delivered into a cell. A transplanted gene may switch off prematurely or not turn off fast enough, causing an undesirable overproduction of its replacement protein.

One way around this problem is to control the expression of the transplanted gene with a system controlled by a small molecule — for example: rapamycin, a well-characterized immunosuppressive drug. As scientists envision the strategy, they stitch a chemical switch next to the gene that only rapamycin molecules can control. Upon administration of the drug, the gene will turn on, leading to protein production. Already, researchers have demonstrated the effectiveness of this approach in the liver, muscle and eye.

Now a team of scientists reports in the January 22, 2004 edition of the *Gene Therapy* journal that they succeeded in getting the so-called "rapamycin gene-activation" system to work in salivary glands. Their finding could one day have important implications for treating a variety of oral conditions with gene therapy.

"Oral ulcers or infections are common, but difficult to treat, but with the rapamycin approach, the duration of the treatment could be controlled," said lead author Dr. Jianghua Wang, a scientist at the National Institute of Dental and Craniofacial Research in Bethesda, Md. "Given these results, it may be possible to transfer and control genes into the salivary glands to treat oral conditions. The big advantage of gene therapy is that only one gene delivery, instead of multiple protein injections, is needed, making it less

COVER ARTIST

Dr. Evelyn McNee of Vancouver would never have classed herself as an artist, but after attending a workshop on how to paint rocks, she now keeps her eyes peeled for smooth rocks along the shoreline that are just the right shape for creating her works of art. This month's cover features her rock panda and rock raccoon. "It is fascinating to experience the transformation of a rock into an animal," Dr. McNee enthuses. "The design is chalked on and then acrylic paints are used to paint the rock. The fine fur on the animals is painstakingly done, using a script cursive brush. The eyes are enhanced with a thick, high-gloss Crystal Cote to make them 3-dimensional, so the animals really do come alive."

Dr. McNee is a former registrar of the College of Dental Surgeons of B.C. and the past chair of the Commission on Dental Accreditation of Canada. She is currently a partner in HealthTeam Associates.

expensive and easier to tolerate for patients."

The complete story, entitled *Gene Therapy in Salivary Glands Could Lead to Promising Applications in Oral Disease*, is online at http://www.nidcr.nih.gov/news/01222004.asp.

Fluoride Levels Linked to Reduced Incidence of Heart Disease

Water hardness and fluoride concentration are inversely related to the incidence of coronary heart disease, while some individual elements, including iron and copper, appear to increase risk as their concentrations rise, according to a report issued by the Geological Survey of Finland (GSF).

"Our study provides further supportive evidence for the importance of the ground water fluoride, and iron and copper concentrations, for the risk of acute myocardial infarction," Dr. Anne Kousa, with the GSF in Kuopio, notes in the report.

The findings appear in the *Journal of Epidemiology and Community Health* 2004; 58(2):136–9.

Pankey Institute's New Center for Professional Journalism

The Pankey Institute for Advanced Dental Education has established a Center for Professional Journalism at its teaching facility in Key Biscayne, Florida. At this centre, dentists and dental professionals will be taught the techniques and principles of writing for such publications as peer-reviewed dental journals, books and textbooks, consumer magazines and newspapers.

For more information about the Center for Professional Journalism, contact Pauline Shaw; tel.: (305) 428-5553; fax: (305) 428-5566; e-mail: cpj@pankey.org.

U of T Unveils Pharmacology Desktop Library for Dentistry

The University of Toronto's new Pharmacology Desktop Library for Dentistry is intended to assist U of T students in their pharmacology studies. It can be accessed by visiting the faculty of dentistry's home page at http://www.utoronto.ca/dentistry, clicking on "Dental Library" and then on the "Pharm. Desktop Library" link in the *Quick Links* box. Clicking on a blue link will take the student to a Web site, full-text article or book within the U of T's library system.

If you are not a U of T student or staff member, you cannot access the full-text articles online from off-campus. However, you can get the abstract of all articles listed through MEDLINE/PUBMED. You are welcome to visit the U of T Faculty of Dentistry Library to view the full-text article, or you may use an article retrieval service.

Sherman Prize Winners

Seven second- and third-year dental students from across Canada have been awarded the John Sherman Prize for academic excellence and leadership by the Alpha Omega Fraternity of Canada. This year's recipients are: Milos Lekic from the University of Manitoba; Jillian Gordon, Yvonne Lam and Michael Landzberg from the University of Toronto; Dara Kimia and Nelly Chafai from the University of Montreal; and Andrea Heckler from McGill University.

Grants and Scholarships from Pierre Fauchard Academy

Over $350,000 is available for grants and scholarships in 2004 from the Pierre Fauchard Academy (PFA). Grant applications must be submitted by June 1, 2004. Absolutely no late submissions will be considered. For more information, e-mail PFA president Dr. Kevin L. Roach at kandaroach@hotmail.com. Or visit www.fauchard.org.

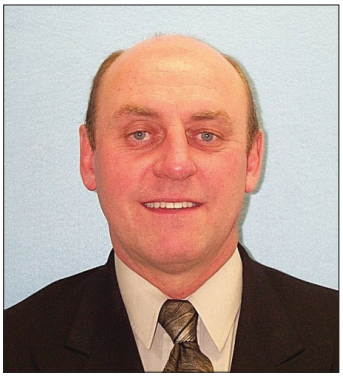
Dentist Not Teens' Ideal Job — U.S. Survey

"Dentist" came in at number 30 in a recent Junior Achievement survey of the job preferences of America's teens. Only 0.8% of respondents selected "dentist," which came in behind "mechanic" and "construction." The ideal job was businessperson, the first choice of 12.8% of the survey respondents. This was nearly twice the number of those who selected "doctor" — 6.5%.

The *2004 JA Interprise Poll on Kids and Careers* was administered in the fall of 2003 in classrooms across the United States to students aged 13 to 18. For more information, visit http://www.ja.org/.

APPOINTMENT

New President of Saskatchewan Dental College



Dr. Brian L. Baker

Dr. Brian L. Baker of Indian Head, Sask., is the new president of the College of Dental Surgeons of Saskatchewan.

A 1984 graduate of the University of Saskatchewan, Dr. Baker served as vice-president of the College in 2002 and 2003. First elected to the College in 1999, Dr. Baker most recently chaired the Third Party and Professional Conduct committees.

For direct access to the Web sites mentioned in the News section, go to the March *JCDA* bookmarks at http://www.cda-adc.ca/jcda/vol-70/issue-3/index.html.

Statements by the fdi FDI World Dental Federation

Effect of Masticatory Ability on General Health

Maintaining masticatory ability has essential benefits not only related to the digestion of food, but may also contribute to physical and mental well-being.

There is evidence to support that:

- Mastication stimulates the flow of saliva. Saliva contains compounds that help maintain the health of oral tissues and protects the body against pathogens.
- Mastication has been demonstrated to increase blood flow within the brain, and to stimulate the central neural activity. The implications are unclear and need to be clarified by further research.
- Loss of masticatory ability may be associated with emotional and physical health complications.

Dentists and patients have a responsibility to contribute to the overall health by maintaining good oral health and masticatory ability.

Further research on the relationship between masticatory ability and overall health is necessary.

Main authors: Prof Minoru Nakata, Prof Hideaki Suda
Submitted by: FDI Science Commission
Reference: FDI Science Commission Project 1-95: Chewing Functions and its Effects on General Health
Nakata, M: Masticatory function and its effects on general health. *Int Dent J* 1998 48:540-548.

FDI Statement
General Assembly 2003

Fluoride in Restorative Materials

Rationale

- The most common reason for the replacement of restorations is secondary caries
- Ionic fluoride has an anti-caries activity, can alter the dynamics of the caries process, can modify the dental hard tissues and has an anti-microbial effect
- The effect of fluoride-releasing restorative materials on the incidence of secondary caries should therefore be further investigated.

Evidence

- Research has been carried out into the release of fluoride from glass-ionomer and resin-modified glass-ionomer cements, resin composites, polyacid-modified resin composites ("compomers"), fissure sealants and amalgam
- There is substantially more laboratory-based research than clinical research
- Comparisons between studies are hindered by the lack of common study designs
- There is equivocal clinical evidence that there is less secondary caries associated with glass-ionomer cements than with other restorative materials
- There is negligible clinical evidence that other fluoride-releasing materials are associated with the inhibition of secondary caries.

Future Research

- There is a need for long-term randomised controlled trials on the effect of fluoride-releasing materials on secondary caries
- There is a need for research to establish the dynamics of fluoride release from such materials.

Clinical Significance

- When selecting a restorative material, all properties, including fluoride release, should be considered
- The success of a restoration depends not only on the choice of material, but also on the skill of the dentist and appropriate preventive measures, including dietary counselling, oral hygiene and exposure to fluoride.

Main authors: Burke F M, Ray N J, McConnell R
Submitted by: FDI Science Commission

FDI Statement
General Assembly 2003

Infection Control in Dentistry

In general the receiving or delivery of appropriate oral care and of associated procedures are safe. Current epidemiological data clearly indicate that there is no significant risk of contracting diseases through the provision of dental treatment when recommended infection control procedures are routinely followed.

A key element of infection control recommended by authorities worldwide is the concept of standard precautions, as a means to reduce the risk of disease transmission (e.g. the Human Immunodeficiency Virus, Hepatitis viruses, Tuberculosis and others) in healthcare settings. The primary precept underpinning this concept is the consideration that all patients are potentially infectious, hence the necessity for implementation of comprehensive infection control procedures when treating any patient.

Universal Infection Control Procedures

- The FDI urges all oral health professionals to adhere to standard precautions as set forth by the local or regional authorities, as appropriate.

Access to dental care

- The FDI believes it is unethical for patients to be denied oral health care solely because of bloodborne disease status.

Vaccination

- The FDI urges oral health professionals who may be exposed to infectious risks to be appropriately vaccinated according to guidelines issued by the local authorities, and to take advantage of other vaccines as and when they become available.

Referral for Medical Evaluation

- The FDI urges all oral health professionals to be alert for signs and symptoms related to bloodborne and other infectious diseases. Individuals with medical histories or conditions suggestive of infection should be referred to their physicians for further management.

Patient Disclosure and Confidentiality

- The FDI urges care providers to have an appropriate protocol, in accordance with applicable local laws, for the confidential handling of information on patients with systemic infections.
- The FDI urges care providers to maintain strict confidentiality of a patient's bloodborne pathogen status and their medical condition. This should not prevent care providers sharing information pertaining to the patient's medical condition with other health care workers, as permitted by local regulations.
- The FDI believes that all patients infected with bloodborne pathogens should disclose their status as part of their medical history. The care provider has to be cognisant of the complete medical history in order to make apposite treatment decisions that are in the best interests of the patient.

Exposure Incidents

- The FDI recommends that all oral health professionals should be familiar with current postexposure protocols for the management of occupational exposures to bloodborne pathogens and institute policies in the work place to ensure appropriate and efficient management of such incidents.

Public Information and Education

- FDI recommends that local or regional dental associations should educate the public on both the efficacy of standard precautions and the absence of a significant risk of contracting bloodborne diseases through the provision of dental care when recommended infection control procedures are routinely implemented.

Professional Education

- The FDI recommends that all oral health professionals keep their knowledge and skills current with regard to infectious diseases that may particularly pose a threat of transmission in clinical settings.
- The FDI recommends the development and updating of local and national educational programmes for the dental team that address infection control recommendations in health care settings (as well as programmes that address the management of the oral and systemic implications of bloodborne diseases).
- The FDI recommends that dental educators comprehensively address and incorporate current infection control recommendations in health care settings in curriculum content and clinical activities.

Mandatory Testing

The FDI opposes any legislation that mandates compulsory testing of dental health care workers to determine their bloodborne pathogen status.

Main authors: Prof L P Samaranayake
Submitted by: FDI Science Commission

FDI Statement
General Assembly 2003

CREATING VALUE FOR CDA MEMBERS

CDA's Surveys Help Its Membership

CDA's upcoming survey of new dentists is designed to help the Association explore the unique attitudes, challenges and needs of this constituency, so that programs can be tailored to match the requirements of graduating students and dentists who have been practising for five years or less.

The survey will cover the challenges facing new dentists; financial and practice management matters; attitudes towards organized dentistry and CDA; and attitudes towards incentive and/or loyalty programs, in which members who use tangible products or services from specific vendors would receive discounts.

As a general rule, surveys allow CDA to determine the interests and needs of its members, giving the Association enough good information that it can formulate plans of action for meeting those needs. A general survey of the overall membership will be conducted later this year.

CDA conducted a readership survey in 2002 to assess attitudes and preferences among dentists who read *JCDA*, *Communiqué* and other CDA publications. The feedback from this survey led to several changes and improvements in the format and delivery of CDA's printed products and electronic communications vehicles.

Skilled research consultants are hired by CDA to analyze these confidential survey results and to extract from them the most accurate and useful findings.

Canadian Dental Association

For information on membership in CDA,
contact Bernadette Dacey, Manager, Membership Promotion,
Canadian Dental Association, 1815 Alta Vista Drive, Ottawa, ON K1G 3Y6;
tel.: (613) 523-1770, ext. 2229; e-mail: bdacey@cda-adc.ca.

CIT Group Ad
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Are Courses on Ethics Worth the Expense?

• **James Trofimuk**, BSc, DDS •

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The simplest way to respond to Dr. Barry Schwartz's article[1] is: "Spoken like a true academic." The answer to ethics is having a course on ethics.

Firstly, most — if not all — psychologists will agree that core values, the basis for ethics, are developed by the early-to mid-teens. Therefore, how do you propose to teach ethics to dentists and students — people who are driven, independent thinkers? Secondly, even if this is not fact, we are talking about a small percentage of dentists in the business. I would argue less than 10%.

Referencing the *Reader's Digest* article, if I remember correctly, this is the article that describes how different dentists, when seeing the same patient, have different treatment plans. Remember that dentists are like economists: put 2 or more in a room, ask the same question and you will get as many different answers.

With regard to the CBC show on Dental Boot Kamp, I am not sure if Dr. Schwartz and I were watching the same program. My recollection is that the show's host wanted the result that Dr. Schwartz references — that Dental Boot Kamp is all about high-pressure sales techniques. Unfortunately, the dentist he put on the program to spy on Dental Boot Kamp actually liked it and signed up for the next session! This dentist was the host's own dentist and one (I would think) he considered of sterling character.

There are probably better ways to address the ethical issue involving such a small percentage of dentists other than with imposed ethics courses. Most likely, the dentists who would attend these courses would be those more interested in acquiring the continuing education requirements than in any value the course might offer.

I believe the ethical problems, if already inherent in the person, are exacerbated by their experience in dental school. The overemphasis on requirements and academic success are a breeding ground for questionable ethical practices when one is in an 'end-justifies-the-means' institution. How students are treated in dental school may have a far greater and lasting effect when they are practitioners then a course on ethics headed something like *How to Play Nice 101*.

My belief about ethical issues is this; it is a busy-ness factor for dentists, a frustration with patients not accepting treatment for what would be an obvious problem or being dictated to by insurance constraints on treatment decisions. In short, if a dentist is concerned about paying the bills at the end of the month, he or she will look for help. If it is not forthcoming from their associations, this help will come from other sources, such as the "boot kamps" willing to fill the void. Obviously, if there is pressure to pay the bills and feed one's family, Maslow's Hierarchy of Needs will prevail, and ethics and morals will be compromised.

Most dentists are too proud to admit they are struggling and need help, so organizations with courses on how to bring in more business are very popular, especially since most associations do not enhance the presence of dentistry in the public's eye. The public knows the importance of good oral care; it just doesn't see the value in actually getting the work done. Money may be an issue for some people, but most would rather buy a carton of cigarettes or a big screen TV or go on a holiday than get the dental care they need.

The profession has to promote dentistry, not from a logic-based approach but from an emotional viewpoint. If logic dictated, why are there not more commercials for floss instead of tooth whiteners? Plastic surgeons market to the emotional wants of prospective patients. What are cosmetic surgeons doing to promote health in a person by placing breast implants or performing a facelift? Yet these surgeons are busy. Dentistry is making people healthy, but it's not "sexy" to change a filling or improve a person's periodontal health. So guess what, the holiday or the laser hair removal trumps a visit to the dental office.

Do not downplay the relevance some courses or programs have in the marketing of dentistry. Teach students and practitioners to approach these marketing programs in the same way that they read a scientific paper. Have them remember the purpose of the course is ultimately for the dentist to take more courses so that business may flourish. Therefore, go in with a critical (yet open) mind. Learn and use what is relevant.

Finally, I would submit that having clinicians with private practice experience teaching ethics is a good idea. The flaw is — who are these clinicians? Could they be part of the 10% of the ethically challenged? How do you propose to decide who will or will not make up these committees? Would members be clinicians who are politically connected or with a strong paradigm belief in one or another methodology of dentistry, trying to impose that belief on the rest of us? Would they be dentists who have a good reputation, with their peers *and* with suppliers, labs and temporary employment agencies? All of these groups deal with dentists on different levels and most likely have a very good idea who they would consider ethical, given that they do business with them regularly.

With respect, I would argue that Dr. Schwartz's reasoning for having committees and courses on ethics would probably serve his career and best interests far more than the interests of the average dental practitioner. Rather than spending money on committees of dentists in boardrooms discussing how dentistry should be, why not spend the money on taking the profession of dentistry to where it ought to be? ◆

***Dr. Trofimuk** maintains a private practice in Calgary, Alberta.*

***Correspondence to:** Dr. James Trofimuk, 3511 Garrison Gate, Calgary, AB T2T 6E4. E-mail: jtrofdds@telusplanet.net.*

The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the Canadian Dental Association.

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Response to Dr. James Trofimuk's Article

With over 25 years of full-time practice in dentistry, I bring more than an academic perspective to ethics. I agree that core values are developed early on, just as motor skills are. The reason dentists spend so much time refining their motor skills is because the tasks at hand are complex and only learned through repeated training. Likewise, an ethical understanding of dental situations and decision-making require similar development and refinement.

There is a great deal of difference between a moral person and one who exercises ethically correct judgment. Ethics training has nothing to do with impeding "driven, independent thinkers," but with opening their eyes to obstacles on the road ahead. The point that I tried to make with the press reports (*Reader's Digest*, CBC's *Dental Boot Kamp* show) is that public trust is at stake when negative stories appear that cause the public to question the ethics of dentists. If dentists can raise the ethical bar and reflect values that are beyond reproach or conflict of interest, the public's trust in them will flourish.

My personal experience with the current educational system in dentistry is that it emphasizes ideal treatment and placing the needs of patients above those of dentists, thus setting us on the right course. Dr. Trofimuk's observations appear to be based on communication difficulties in motivating and guiding patients to value and accept what is in their best interest. I would recommend a communications course over a marketing seminar, to differentiate clearly what is in the patient's versus the dentist's best interest.

Financial pressures can often serve as weak rationalizations to forgo ethical principles. This is precisely why more ethics undergraduate education *is* necessary. I question the accuracy of statements indicating that only 10% of dentists are "ethically challenged." One has only to read the proceedings from the complaints and discipline committees of the regulatory bodies to realize that serious problems exist out there. Although, even if that percentage is accurate, does not every person deserve the best treatment? Should 10% of our population suffer from the poor judgment of their dentists? By assuming that I have a conflict of interest in suggesting that we, as dentists, need to tackle this problem in a defined and organized manner, only highlights the necessity to have a forum for working through the ethical challenges that dentistry faces, and sharing that information with those who want to learn from it. Ethics committees are not a threat to dentists. They will not tell them what to do or how to do it, but would be available to offer guidance on difficult questions, when asked. Dentists should not be resigned to learning only by their mistakes. We owe it to our patients to learn from the mistakes of others, so as to better ourselves and be able to make the correct decisions for our patients.

With regard to who should serve on these committees, if higher education in dental ethics were more available, these ethics course graduates would be ideal members. ◆

Dr. Barry Schwartz

Self-Inflicted Cosmetic Tongue Split: A Case Report

• Tim Bressmann, PhD •

Abstract

The objective of this case study was to obtain some first-hand information about the functional consequences of a cosmetic tongue split operation for speech and tongue motility. One male patient who had performed the operation on himself was interviewed and underwent a tongue motility assessment, as well as an ultrasound examination. Tongue motility was mildly reduced as a result of tissue scarring. Speech was rated to be fully intelligible and highly acceptable by 4 raters, although 2 raters noticed slight distortions of the sibilants /s/ and /z/. The 3-dimensional ultrasound demonstrated that the synergy of the 2 sides of the tongue was preserved. A notably deep posterior genioglossus furrow indicated compensation for the reduced length of the tongue blade. It is concluded that the tongue split procedure did not significantly affect the participant's speech intelligibility and tongue motility.

MeSH Key Words: *self mutilation/complications; speech; tongue/injuries*

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Cosmetic "body modifications" include piercing of the tongue, lips, face and genitals; deliberate scarring; "branding" with hot irons; the subcutaneous implantation of studs; and the tongue split. The body artists who perform these operations are medically untrained. Both they and their clients regard body modifications as not very invasive or dangerous. However, there is increasing evidence in the literature that tongue and lip piercings may lead to tooth fractures,[1,2] gingival recession,[3,4] severe wound inflammation,[5,6] allergic reactions,[7] brain abcesses[8] and endocarditis.[9,10] The cosmetic tongue split operation is a relatively recent fashion trend. In this procedure, the anterior tongue blade is cut apart along the midline and cauterized to prevent reattachment of the separated sides. So far, functional consequences of this operation have only been addressed in one previous publication: Benecke[11] describes the case of a young woman who underwent a tongue split procedure along with a number of other body modifications.

The author comments that speech and swallowing were unaffected by the procedure, but this is only an impressionistic assessment. As body modifications seem to become only more fashionable and popular, it is important to gain knowledge about possible adverse effects of tongue split operations on speech and tongue movement. In particular, dentists, oral surgeons and speech-language pathologists need to know if there is a new group of clients in the making. The purpose of this case study was to obtain first-hand information about the functional consequences of a cosmetic tongue split operation for speech and tongue motility.

Case Presentation

The participant was a 33-year-old man who works as a self-employed body artist and specializes in facial and genital piercing, scarring, branding and jewellery implantation, but has no formal medical training. The patient reported no previous history of speech, language or hearing disorders. He had performed the tongue split procedure on himself 2 years previous to the interview in his home during a social get-together. The operation had been performed under a light topical anesthetic with a surgical scalpel. He had cut his tongue blade along the lingual midline and cauterized the wound with a red-hot steel bead.

The participant reported that the wound healing and swelling had been uncomplicated. On extreme tongue protrusion and lateralization, he occasionally experienced shooting pains in the left side of the tongue, due to an irritation of the lingual nerve. He had only noted speech problems during the acute healing phase. Following the tongue split, the participant observed contraction and stiffening of the scars and had tried to counteract this by stretching exercises. Despite these efforts, he estimated that the tongue blade was now about 7 mm shorter in length than before the operation.

Figure 1: *View of the tongue split during lingual elevation towards the prolabium.*

Figure 2a: *Midsagittal diagram of the position of the tongue during the production of 'ng'. The dorsum of the tongue is raised posteriorly towards the soft palate. The tip of the tongue is retracted.*

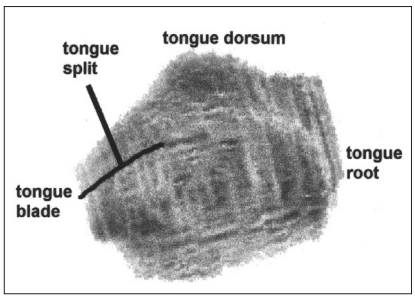

Figure 2b: *Three-dimensional ultrasound scan of dorsal elevation of the tongue during sustained 'ng'. The synergy of the 2 sides of the tongue is preserved. The midline split of the tongue blade can be visualized (indicated with a black line).*

In a clinical assessment of tongue motility, the participant demonstrated sufficient lingual movement range. The blade of the tongue appeared shortened, particularly in lingual elevation towards the prolabium (**Fig. 1**). The participant could not demonstrate independent antagonistic movement of the 2 sides of the tongue. Four speech-language pathologists with over 10 years of professional experience reviewed a digitized 30-second sample of the participant's spontaneous speech, and assessed speech intelligibility and acceptability as a percentage. They also commented on specific articulatory distortions. The mean of the 4 intelligibility ratings was 99.25% (standard deviation [SD] = 1.5). The mean of the 4 ratings of speech acceptability was 96.25% (SD = 4.79).

Two of the raters perceived slight distortions of the sibilants /s/ and /z/. To visualize the split tongue during speech sounds, 3-dimensional ultrasound scans were made while the participant sustained the sounds 'sh', 's', 'r', 'l', 'n', and 'ng' (the velar nasal sound in the word "long").

The ultrasound scans were made with a General Electric Logiq α100 MP ultrasound machine (General Electric Medical Systems, Milwaukee, Wis.), using a 6.5 MHz endocavity ultrasound transducer E72 (General Electric Medical Systems) and the 3D-Echotech Freescan software (3D Echotec GmbH, Halbergmoos, Germany).

The ultrasound examination demonstrated that the synergy of the 2 sides of the tongue was unaltered. The midline scar could be visualized during retraction of the tongue tip (**Figs. 2a** and **2b**). A higher arching of the anterior dorsum of the tongue in alveolar sounds indicated a compensatory increase in medial compression of the 2 disconnected sides of the tongue blade.

Conclusion

The tongue split operation has high risks for inflammation, dehiscence, infection and injury to supplying nerves or arteries. It is certainly not to be recommended, particularly when it is done in a "do it yourself" fashion, as is suggested on Web sites and in fanzine publications. However, apart from the slight sibilant distortions and the shortening of the tongue blade, the overall functional outcome was surprisingly good in the presented case. ◆

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Dr. Bressmann *is assistant professor, graduate department of speech-language pathology, University of Toronto, Toronto, Ontario.*

Correspondence to: *Dr. Tim Bressmann, Graduate Department of Speech-Language Pathology, University of Toronto, 500 University Avenue, Toronto ON M5G 1V7. E-mail: tim.bressmann@utoronto.ca.*

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Bifid Mandibular Condyle: Case Report and Etiological Considerations

• **Marcelo Augusto Oliveira de Sales,** DDS •
• **José Ivo do Amaral,** DDS, MSc •
• **Rivadávio Fernandes Batista de Amorim,** DDS, MSc •
• **Roseana de Almeida Freitas,** DDS, MSc, PhD •

Abstract

Bifid mandibular condyle, usually diagnosed on routine radiographic examination, is described in the literature as a rare entity. Its cause is controversial, and it has no predilection by sex or ethnic background. Dental professionals should have some knowledge of this anatomic abnormality, as well as its implications for function and appropriate treatment modalities, so that they can be alert to this potential diagnosis. This paper reports an unusual case of bifid mandibular condyle with possible traumatic cause, with emphasis on the radiographic and tomographic findings.

MeSH Key Words: *child; jaw abnormalities/radiography; mandibular condyle/abnormalities*

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The bifid mandibular condyle (BMC) represents a rare developmental anomaly first described in 1941,[1] and only a few cases have been reported since. Several factors have been cited as possible causes of BMC, including condylar fracture, developmental anomalies, perinatal trauma, teratogenic embryopathy and surgical condylectomy.[2,3] It usually affects only one condyle, and the observation of bilateral BMC is exceptionally rare.[4] BMC is usually identified as an incidental finding on routine radiographic examination.[5] This paper reports a clinical case of unilateral BMC possibly resulting from trauma, with emphasis on causative factors, diagnosis, radiographic and tomographic features, and management.

Case Report

A 4-year-old white boy was admitted for clinical evaluation 4 days after experiencing facial trauma in a bicycle accident. Facial asymmetry was observed on admission, with midline deviation to the right side associated with restriction of jaw opening and pain (**Table 1**). The child had not previously had any serious disease, and there was no significant family history of disease or anomaly. Dental panoramic radiography revealed intracapsular fracture of the right mandibular condylar head (**Fig. 1**). Initial treatment consisted of nonsurgical reduction (closed technique) of the condylar fracture under general anesthesia (via nasotracheal intubation) and maxillomandibular fixation. During the procedure, condylar repositioning was difficult even with use of a muscular relaxant. The patient was discharged from hospital 2 days after the procedure. Orthodontic therapy with fixed appliances and rubber bands was initiated to guide mandibular functional movements. The patient subsequently underwent clinical and radiographic follow-up every 6 months.

During the routine follow-up examination 2 years after the initial nonsurgical treatment, more severe facial asymmetry and midline deviation to the right side were noticed (**Table 1**), although the patient reported no pain. Radiographic examination at this time revealed changes in the shape and size of the right condyle as well as the collateral mandibular ramus and chin (**Fig. 2**).

The patient continued with orthodontic therapy, and at the 4-year follow-up the clinical findings were as follows (**Table 1**): jaw opening of 35 mm; severe facial asymmetry and midline deviation to the right side; painless, asymptomatic temporomandibular joints (TMJ); and preservation of mandibular function.

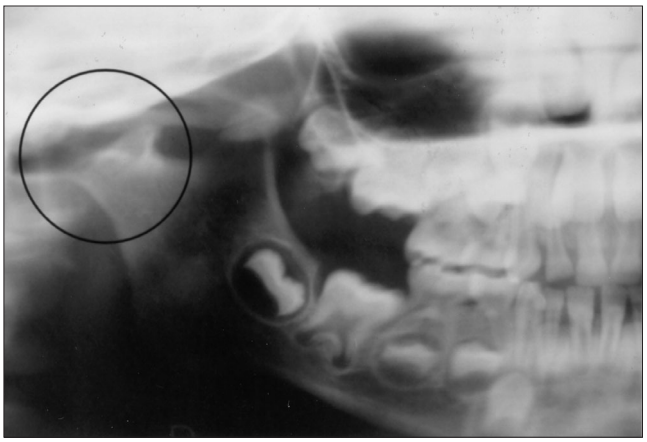

Figure 1: *Detail of dental panoramic radiograph obtained during the initial presentation shows fracture of the right condylar head.*

Figure 2: *Axial radiograph obtained at the 2-year follow-up. Alterations in the right condyle are indicated by morphological changes and deviation of the contralateral mandibular ramus and chin.*

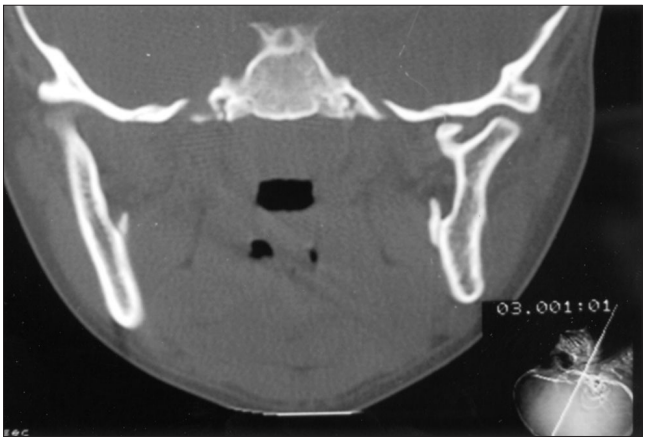

Figure 3: *Coronal computed tomography section with X, Y and Z axes, obtained at the 4-year follow-up, indicates bifid mandibular condyle on the right side.*

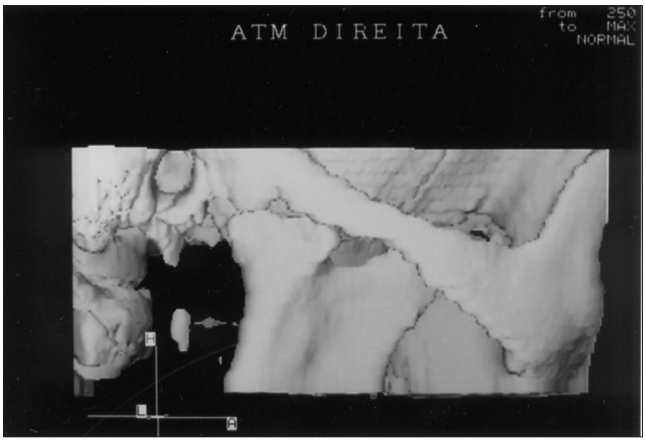

Figure 4a: *Three-dimensional reconstruction of the temporomandibular joint, based on helical computed tomography (performed at the 4-year follow-up). This image shows the affected side.*

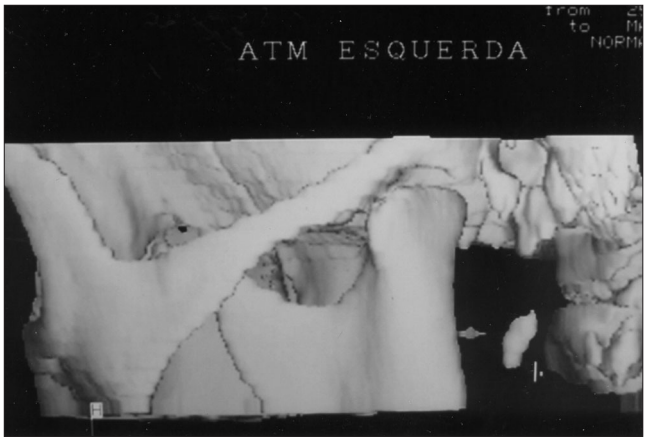

Figure 4b: *Three-dimensional reconstruction of the temporomandibular joint, based on helical computed tomography performed at the 4-year follow-up. This image shows the normal side.*

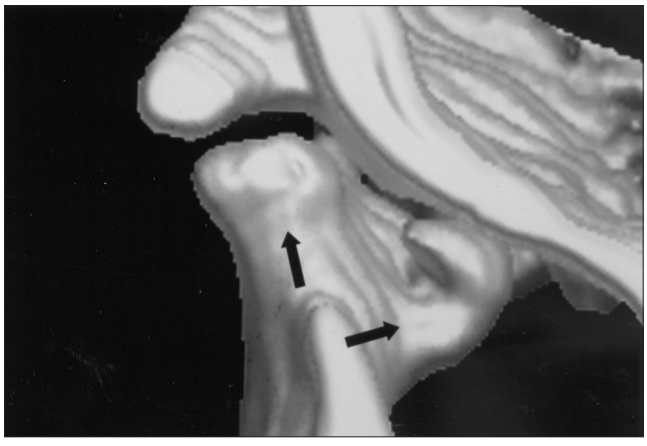

Figure 5: *Three-dimensional reconstruction based on helical computed tomography (performed at the 4-year follow-up) indicates the presence of a bifid mandibular condyle. The medial (left) and lateral (right) condylar heads are evident.*

Table 1 **Clinical data for a child with bifid mandibular condyle who experienced facial trauma at 4 years of age**

Time of evaluation	Clinical data		
	Facial asymmetry	Midline deviation	Jaw opening
Initial presentation	Yes	2 mm	40 mm
2-year follow-up	Yes	4 mm	36 mm
4-year follow-up	Yes	8 mm	35 mm

Unexpectedly, radiographic and tomographic examination at the same time clearly showed development of BCM on the right side, which led to the suggestion of a possible correlation with the previous condylar fracture (**Figs. 3** to **5**). Helical tomography and 3-dimensional (3D) reconstruction were performed at the Radiology Institute of Natal (Natal-RN, Brazil) with an Elscint Twin-Flash device (Elscint, Haifa, Israel). This scanning was performed in the axial plane according to usual TMJ protocols. The patient continues to receive regular follow-up. Once his facial growth has stopped, he will undergo surgical treatment consisting of maxillomandibular osteotomies and further orthodontic treatment.

Discussion

The first description of BMC was published by Hrdlicka,[1] who found 27 cases of this anomaly while analyzing male and female dried human skulls in a Smithsonian Institution collection. Since then, only a few cases have been reported in living human beings. Szentpétery and others[6] examined a total of 1,882 skulls in 1990 and identified 7 with signs of BMC; in 2 cases, 1 mandible had bilateral signs of grooving. According to Cowan and Ferguson,[5] at least 36 clinical cases of BMC had been reported up to 1997. MEDLINE was used to search the medical literature (from January 1998 through October 2002) for English-language case reports of BMC in living subjects. Only 2 additional papers, reporting a total of 5 cases, were identified, which yields a total of 41 cases (see **Table 2** at http://www.cda-adc.ca/jcda/vol-70/issue-3/158.html). These data indicate the rarity of this condition.

BMC has been reported in patients of various ethnic backgrounds and both sexes.[4,18] According to Loh and Yeo,[18] 67% of patients with BMC had no complaints related to the affected condyles: the condition was detected as an incidental finding during dental radiographic examination. Nonetheless, nonspecific symptoms have been detected in some cases, such as general pain, swelling, articular clicking and, occasionally, limited oral opening and deviation toward the affected side.[17,21]

The etiopathogenesis of BMC remains unknown, despite the various factors that have been suggested as possible causes.[5,15,22] For example, Blackwood[23] stated that the condylar cartilage, during the early stages of its development, is divided by well-vascularized fibrous septa and suggested that persistence of such a septum, in exaggerated form, within the growing cartilage might lead to an error in development that would in turn give rise to the bifid condition. This author also mentioned rupture of septal blood vessels as another possible cause of BMC. This theory might explain how forceps delivery, if it caused hematoma, could lead to BMC formation. However, Gundlach and others[15] found no evidence of persistent septa in the cases of BMC that they examined.

It must be stressed that the mandibular condyle region is a crucial centre of facial growth. Thus, injuries during childhood and puberty could lead to condylar malformations including BMC and severe facial asymmetry.[20] Post-fracture healing and remodelling of the mandibular condyle, if they involve lateral and medial fragments, have also been linked to development of ankylosis or BMC.[24] Szentpétery and others[6] stated that the site of the fracture and, most probably, its relation to the insertion of the lateral pterygoid muscle may determine future development of a normal or bifid condyle.

A possible genetic origin of this abnormality has also been suggested, and some authors have speculated that it occurs secondary to a variety of factors such as endocrine disturbances, exposure to teratogenic substances, nutritional deficiencies, infection and radiation.[25,26] Support for the latter suggestions comes from the work of Gundlach,[22] who experimentally induced bifid condyles in animals by injecting teratogenic substances such as *N*-methyl-*N*-nitrosourea and formhydroxamic acid in different concentrations at various stages of pregnancy. In addition, some reports of BMC have established a relation between the origin of the condition and the glenoid fossa: in developmental BMC there is a separate glenoid fossa for each of the 2 parts, whereas in traumatic BMC there is only one glenoid fossa.[6,9]

The reported existence of 2 different patterns of condyle bifidism might be related to distinct causes for each type. Thus, it is postulated that the anteroposterior pattern results from facial trauma during childhood, and the mediolateral form can be linked with persistence of the fibrous septa at the condylar cartilage.[6] Although this model may fit in the majority of cases, Cowan and Ferguson[5] gave several examples of BMC that did not fit this profile. Moreover, the degree of splitting ranges from a shallow groove on the condyle to 2 distinct condyles with a separate neck; the orientation of the head may be mediolateral (coronal) or anteroposterior (sagittal).[6,20]

Advances in dental science in the past few years have included the development and improvement of new diagnostic techniques that allow easier and earlier detection

of pathological conditions in the maxillofacial region. In this context, advances in radiographic and imaging methods have led to various options for visualizing the TMJ.

In general, the first diagnostic radiographic survey performed for examination of condyle disturbances is dental panoramic radiography, because of its wide availability and low cost.[21] However, computed tomography (CT) is undoubtedly the best choice for TMJ examination because it allows bilateral visualization without osseous superpositioning. Helical CT is now the state-of-the-art method for TMJ visualization, especially after facial trauma.[20] Helical CT, which is based on the acquisition of multiple continuous slices of the anatomic site of interest, has several advantages, such as complete recording of the area with a single scan, short examination times (which makes it especially suitable for children), lower radiation dose and better image quality.[20,27] With this technique it is possible to evaluate both quantitatively and qualitatively the effects of trauma on condyle size and shape, sclerosis and cortical irregularities, joint position, neck length, condylar and intercondylar angle, flattening of the articular eminence and depth of the glenoid fossa.[20,24] Three-dimensional reconstruction can then be used to assess condylar shape (including deformity) and neo-arthrosis or pseudo-arthrosis formation, as well as hypoplastic and hyperplastic changes at the condyle.[20] Furthermore, 3D reconstruction allows more accurate evaluation of condylar morphology than 2D tomographic images.[27]

The long-term functional effects of BMC are not well known because the literature on this subject is scant. Some authors have suggested that sagittal fracture may cause bifidism of the condyle.[6,24] Wu and others[19] demonstrated that surgically induced fracture of the mandibular condyle could produce secondary trauma to the disc and the glenoid fossa, with resultant osteoarthrosis of the injured TMJ. Thus, BMC linked to mandibular fractures could lead to the alterations described.

According to García-Gonzáles and others,[21] appropriate treatment for BMC depends on the symptoms. Asymptomatic cases do not require any treatment, although long-term follow-up is necessary. Patients with internal articular derangement should be treated with occlusal splints and arthroscopic surgery.[21] Condylectomy and arthroplasty for functional repair is recommended in cases with associated articular ankylosis; success depends on correct excision of the affected area.[17]

In the case described here, it is believed that the bifid condyle is related to the mandibular trauma suffered during childhood. The long-term treatment options are costochondral graft or osteogenic distraction. At the time of the future surgical treatment, maxillomandibular osteotomies will be performed. At present, the patient is only undergoing regular follow-up, because facial growth is incomplete and the success of surgical treatment at this time would be limited. Two major factors must be considered in determining the appropriate time for surgery: functional and esthetic considerations. If there are no problems with either maxillomandibular function or esthetic appearance, surgery should be postponed until the patient's facial growth has stopped. In the case described here, it has been possible to postpone surgical treatment because maxillomandibular function has been preserved. Although there is some facial asymmetry, the patient has no complaints in this regard. The precise orthodontic treatment cannot be predicted, but it will be designed to align the level of the dental arches. ◆

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Dr. de Sales *is a specialist in oral and maxillofacial radiology and a post-graduate student in oral diagnosis, department of clinical and social odontology, School of Dentistry, Federal University of Paraíba, João Pessoa-PB, Brazil.*

Dr. do Amaral *is adjunct professor, department of oral and maxillofacial surgery, School of Dentistry, Federal University of Rio Grande do Norte, Natal-RN, Brazil.*

Dr. de Amorim *is a post-graduate student of oral pathology, department of oral pathology, School of Dentistry, Federal University of Rio Grande do Norte, Natal-RN, Brazil.*

Dr. de Almeida Freitas *is adjunct professor and coordinator of the post-graduate program in oral pathology, department of oral pathology, School of Dentistry, Federal University of Rio Grande do Norte, Natal-RN, Brazil.*

Correspondence to: *Dr. Marcelo Augusto Oliveira de Sales, Programa de Pós-Graduação em Patologia Oral, Departamento de Odontologia – Universidade Federal do Rio Grande do Norte (UFRN), Av. Senador Salgado Filho, 1787, Cep. 59056-000, Lagoa Nova, Natal-RN, Brasil. E-mail: patologiaoral@patologiaoral.com.br.*

The authors have no declared financial interests.

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Intentional Angulation of an Implant to Avoid a Pneumatized Maxillary Sinus: A Case Report

• **Terry J. Lim,** DMD, Dip Prostho, FRCD(C) •
• **Anna Csillag,** DDS, Dip Oral Rad, FRCD(C) •
• **Tassos Irinakis,** DDS, Dip Perio, MSc •
• **Adi Nokiani,** BSc, DMD •
• **Colin B. Wiebe,** DDS, Dip Perio, MSc, FRCD(C) •

Abstract

This case report describes placement of an implant in the posterior maxilla so as to avoid a pneumatized sinus and also to avoid the need for a sinus lift procedure. An 81-year-old woman presented with an edentulous span in the upper right posterior maxilla. She had been missing teeth in this area for many years, and there was a combination of resorption of the alveolar ridge and pneumatization of the maxillary sinus. Eleven years previously, implants had been placed anterior to this region, but the patient was told that implants could not be placed posteriorly unless a sinus lift was done. At the time of the current presentation she was still unwilling to undergo a sinus lift procedure but wanted to know if implants could be placed in the posterior right maxilla. A tomogram obtained with a radiographic stent in place indicated that there was insufficient bone height to allow placement of implants at the usual angulation without a sinus lift. Therefore, to avoid the need for a sinus lift, 2 implants were placed with palatal angulation as guided by a tomographically determined surgical stent. The treatment planning and surgical and restorative techniques are reviewed here. A postoperative tomogram was obtained to determine the final position of the implants. The outcome has been favourable for the patient and the clinicians. In situations where there is sufficient palatal bone medial to the maxillary sinus, placing implants at an angle may prevent the need for a sinus lift procedure, assuming that proper development of an occlusal restorative scheme is possible.

MeSH Key Words: *dental implantation, endosseous/methods; dental prosthesis design; maxilla/surgery; tomography, x-ray computed*

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The presence of a pneumatized maxillary sinus is often a contraindication to the placement of osseointegrated implants in the posterior maxillary segments without prior surgical procedures, such as onlay-type maxillary ridge augmentation,[1] sinus lift techniques[2,3] and the less invasive osteotome technique.[4] These techniques have yielded good success rates, although many patients are hesitant to undergo them because they are perceived as invasive.[5,6] In the case of the sinus lift, complications may occur,[7,8] and the 2-stage technique that is often employed lengthens treatment time by 6 to 12 months (the period needed for the bone graft to be incorporated). Patients are more likely to accept overall treatment that avoids the need for a sinus lift.

Case Report

An 81-year-old woman presented with a request for placement of osseointegrated implants in the second premolar and molar sites of the right maxilla. She was taking medication for hypertension (irbesartan), hormone replacement therapy (conjugated equine estrogen) and osteoporosis (etidronate). She had smoked for 35 years but had quit 25 years previously. All teeth on the right maxilla other than the central incisor had been missing for 20 years. Eleven years previously 2 implants had been placed in the right lateral incisor and cuspid positions (**Fig. 1**). The implant in the maxillary right cuspid location was angulated distally, which prevented future placement of an implant in the first premolar site (**Fig. 2**). The implants had been placed in the existing ridge, which had subsequently

Figure 1: *Implants placed in the site 12 and 13 region of an 81-year-old woman 11 years previously. The angled abutment was an esthetic concern, and there was a cantilever pontic at site 14.*

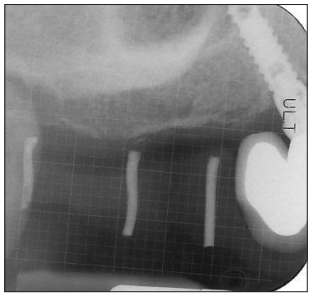

Figure 2: *Periapical radiograph of the site 13 implant, which is distally angulated into site 14. A grid shows lack of bone height at sites 15 and 16.*

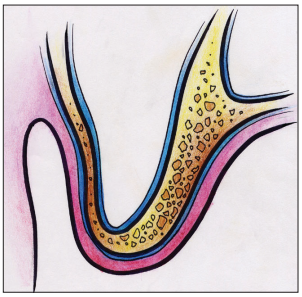

Figure 3a: *Diagram of the bone located inferior to the right maxillary sinus.*

Figure 3b: *Diagram of the traditional sinus lift procedure.*

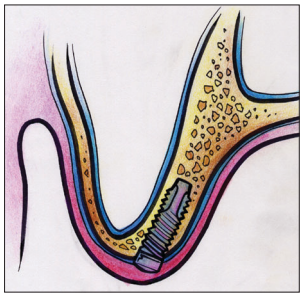

Figure 3c: *Diagram of the implant angulation strategy employed in this case to avoid a sinus lift procedure.*

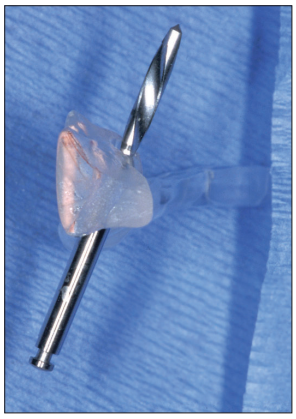

Figure 4: *Radiographic and surgical stent. The drill is positioned at 31°.*

resorbed; the result was palatal positioning that necessitated an angled abutment to restore the teeth in non-crossbite occlusion. The metal of the abutments were apparent when she smiled, although she was not concerned about this esthetic compromise. The implants in sites 12 and 13 had been restored by splinting them together and adding a cantilever pontic at site 14.

The patient was happy with her previous implant therapy but desired more posterior teeth on the right maxilla. At the time of the initial implant treatment she had been told that posterior implants could not be placed unless a sinus lift was done first. She had declined the sinus lift at that time and had proceeded with the site 12 and 13 implants. She was now hopeful that new types of implants or techniques might allow her to have posterior teeth without undergoing a sinus lift. Tomography performed with a radiographic stent in place revealed 4 to 6 mm of vertical bone height from the crest of the ridge to the floor of the sinus. Interestingly the tomograms also showed a thick palatal wall from the medial wall of the sinus to the hard palate, and it was decided to use the palatal bone rather than elevating the sinus (**Figs. 3a** to **3c**).

Preoperative Evaluation

A radiographic stent with gutta-percha markers was used for the tomographic scan. The most incisal point of the gutta-percha marker over the desired implant site was used as a reference point (**Fig. 4**). To accommodate the implant into the medial wall of the sinus, angulation of 31° for the tooth 15 implant and 30° for the tooth 16 implant was necessary. A protractor was used to draw lines on the stent at the necessary angles for each corresponding marker. A 2-mm twist drill (Nobel Biocare, Göteborg, Sweden) was then used to hollow out the stent at the necessary angles. The surgeon could then use the predrilled angles in the stent to guide both the pilot drill and the 2-mm twist drill.

A Comm-Cat IS-2000 complex-motion tomographic unit (Imaging Sciences International, Hatfield, Pa.) was used for tomographic evaluation of the area of missing teeth 14, 15 and 16. A tomographic stent with gutta-percha markers intimately adapted to the buccal surfaces of the teeth at the proposed sites of implantation was in place during the imaging. A maxillary vertex view was obtained and scanned into the computer. This initial image of the maxillary vertex, along with scout images, helped in selecting the angle of the cross-sectional cuts to yield accurate anatomic information. Special care was taken to align the tomographic plane (layer) perpendicular to the alveolar process.

Slice thickness was set at 2 mm for the cross-sectional images and 15 mm for the sagittal (reference) views. The magnification was 26% throughout (Grossman technique).

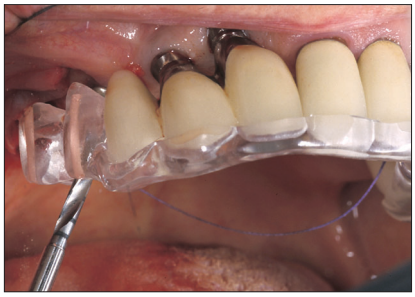

Figure 5a: *With the surgical stent in place, the osteotomy was performed according to angulation determined from the tomograms.*

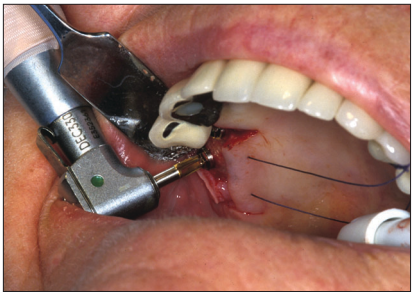

Figure 5b: *Insertion of the implant.*

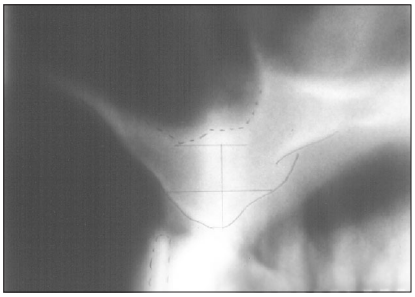

Figure 6a: *Pretreatment tomogram of site 15.*

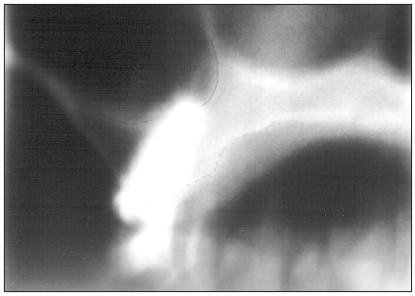

Figure 6b: *Post-treatment tomogram of site 15. There is minor penetration at the superior extent of the implant.*

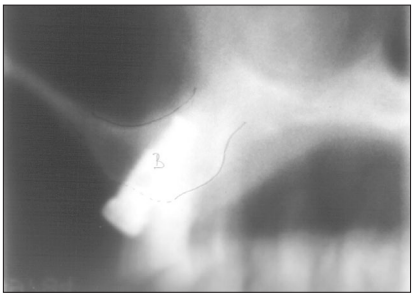

Figure 6c: *Post-treatment tomogram of site 16.*

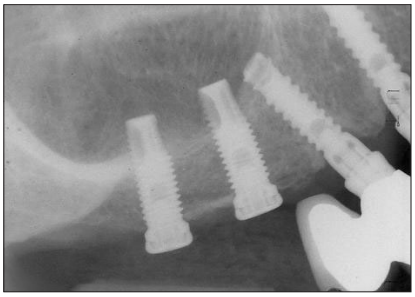

Figure 6d: *Final periapical radiograph before restorative treatment was initiated.*

Figure 7: *Angulation of pick-up impression copings used to create the master cast.*

Figure 8: *Final prosthesis 6 months after placement.*

Hypocycloidal motion was used for both the cross-sectional and sagittal views. During scanning, a cross-sectional tomogram was obtained every 3 mm through the area of interest. The tomograms were traced, and height and width were measured for each individual slice. The height measurements were performed in the axial inclination as indicated by the tomographic markers (5.5 to 8.5 mm through the scanned area). The tomograms revealed that the cortices were well defined and of nearly uniform thickness. The cancellous bone was of relatively lower density, consisting of smaller marrow spaces and a regular trabecular network.

The extent of the maxillary sinus was evaluated in the sagittal plane and in the bucco-palatal direction. This structure appeared to occupy the buccal portion of the alveolar process, with sufficient bone remaining between the medial part of the maxillary sinus and the palatal aspect of the alveolar process. Mild thickening of the mucosal lining, parallel to the floor of the maxillary sinus, was noted; this was most likely of infectious or allergic origin. No significant buccal or palatal resorption of the alveolar process was observed, and the alveolar process was 11 to 13 mm wide in the area of interest.

Surgical Procedure

A full-thickness crestal incision was made from site 14 distal to the 17 area, with small releasing incisions to the buccal and palatal surfaces (on both the mesial and distal extent of the flap; **Figs. 5a** and **5b**). The palatal flap was held in a retracted position by a suture that encircled a bicuspid on the left maxilla. The radiographic stent was positioned, and a round bur was used to start the osteotomy; the standard 2-mm twist drill was then used in the Brånemark implant system (Nobel Biocare). A standard osteotomy was prepared with the pilot drill and 3-mm twist

drills, along with direction indicators and depth gauges. Two Brånemark Mark III implants (11.5 mm × 3.75 mm diameter; Nobel Biocare) were placed at sites 15 and 16. Bone quality was classified as type 3. Cover screws were placed, and the incision was closed with interrupted 4-0 sutures. The patient attended postoperative appointments at 3 weeks and 2 months. At 4 months the implants were uncovered and 3-mm healing abutments were placed.

Before the restorative phase of treatment was initiated, new tomograms were obtained to confirm the position of the implants relative to the maxillary sinus and the palatal wall. The scanning parameters for the postsurgical tomographic evaluation were the same as for the initial evaluation. Both implants appeared to be well integrated, with no perifixtural bone loss. The implants were positioned at a palatal axial inclination, between the inferior and medial wall of the maxillary sinus and the palatal cortex of the alveolar process (**Figs. 6a** to **6d**). The most superior part of the implant at site 15 appeared to have minor penetration into the air space of the maxillary sinus, but no mucosal reaction was noted at the site of perforation.

Restorative Procedure

Because of the severe angulation of each implant (31° from the long axis of the marker), an initial transfer impression was taken, with transfer impression copings (3i Implant Innovations Inc., Palm Beach Gardens, Fla.) being used to locate the implants. A custom tray was then fabricated and a final pick-up impression, with pick-up impression copings (3i Implant Innovations Inc.), was used to create the master cast (**Fig. 7**). Custom abutments were used to correct the angulation, which was then tried in to verify implant position intraorally and the positions on the master cast. A pattern resin index (GC Corporation, Tokyo, Japan) was used to maintain the relation between the 2 custom abutments. After verification of the fit of the abutments, a new occlusal registration was taken, and final crowns, consisting of porcelain fused to metal, were fabricated. The prosthesis was tried in and then cemented in with TempBond (Kerr Corporation, Romulus, Mich.) (**Fig 8**).

Conclusions

The posterior maxilla often loses horizontal bone from the buccal aspect, this resorption being most evident in the first year after extraction of the teeth and slowing thereafter.[9,10] As a result, the maxilla may develop a crossbite tendency with the existing mandible, which may create problems for development of the final occlusal scheme during definitive restoration. The success of using angulated abutments in this situation is well established.[11,12] In the case reported here, angulated abutment and cemented crowns were used to correct the 31° angulation of the 2 implants.

The osteotome technique requires sufficient initial bone height and seems more appropriate for single implants. In this case there was probably sufficient bone height for initial fixation. However, the osteotome technique was not used because the 2 implants were being placed adjacent to one another and the more vertical angulation of the implants, combined with the palatal direction of maxillary bone resorption, would have necessitated facial correction, as was the case for the previously restored site 12 and 13 implants.

The positioning of the 2 implants was planned so that the head of each implant exited the alveolar ridge near the functional cusps of the mandibular teeth. Correction of the 31° angulation of the implants allowed the crowns to be fabricated such that a crossbite was avoided. Although appearance was not of major concern to the patient, the use of custom abutments yielded superior esthetic appearance anteriorly (relative to the original fixed-bridge implant). The custom abutments also eliminated the access hole that is used in screw-retained restorations. The use of the angulated implants also helped the patient to accept the treatment because it addressed her desire to avoid intrusion into the right maxillary sinus with either a sinus lift procedure or the osteotome technique. Although the osteotome technique can be effective, the angulated implant in the medial wall of the sinus offers both the surgeon and the prosthodontist an alternative to traditional implant placement in this location. ◆

***Dr. Lim** is in full-time specialist private practice in prosthodontics in Calgary, Alberta.*

***Dr. Csillag** is in full-time specialist private practice in oral and maxillofacial radiology in Calgary, Alberta.*

***Dr. Irinakis** is a full-time clinical assistant professor at the University of British Columbia, Vancouver. He is also in part-time private practice in periodontics in Vancouver.*

***Dr. Nokiani** has recently completed his DMD training at the University of British Columbia in Vancouver.*

***Dr. Wiebe** is in full-time specialist private practice in periodontics in Calgary, Alberta. He is also a part-time clinical assistant professor at the University of British Columbia, Vancouver.*

***Correspondence to:** Dr. Tassos Irinakis, Faculty of Dentistry, University of British Columbia, 2199 Wesbrook Mall, Vancouver, BC V6T 1Z3. E-mail: irinakis@interchange.ubc.ca.*

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Exposure to the Dental Environment and Prevalence of Respiratory Illness in Dental Student Populations

• **Frank A. Scannapieco,** DMD, PhD •
• **Alex W. Ho,** MA, MSc •
• **Maris DiTolla,** BSc •
• **Casey Chen,** BDS, PhD, DDS •
• **Andrew R. Dentino,** DDS, PhD •

Abstract

Objective: *To determine if the prevalence of respiratory disease among dental students and dental residents varies with their exposure to the clinical dental environment.*

Methods: *A detailed questionnaire was administered to 817 students at 3 dental schools. The questionnaire sought information concerning demographic characteristics, school year, exposure to the dental environment and dental procedures, and history of respiratory disease. The data obtained were subjected to bivariate and multiple logistic regression analysis.*

Results: *Respondents reported experiencing the following respiratory conditions during the previous year: asthma (26 cases), bronchitis (11 cases), chronic lung disease (6 cases), pneumonia (5 cases) and streptococcal pharyngitis (50 cases). Bivariate statistical analyses indicated no significant associations between the prevalence of any of the respiratory conditions and year in dental school, except for asthma, for which there was a significantly higher prevalence at 1 school compared to the other 2 schools. When all cases of respiratory disease were combined as a composite variable and subjected to multivariate logistic regression analysis controlling for age, sex, race, dental school, smoking history and alcohol consumption, no statistically significant association was observed between respiratory condition and year in dental school or exposure to the dental environment as a dental patient.*

Conclusion: *No association was found between the prevalence of respiratory disease and a student's year in dental school or previous exposure to the dental environment as a patient. These results suggest that exposure to the dental environment does not increase the risk for respiratory infection in healthy dental health care workers.*

MeSH Key Words: *dental equipment/microbiology; infection control, dental; respiratory tract infections*

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There has been some concern over the past several decades that exposure to the dental environment, in particular dental workplace aerosols (DWAs), increases the risk of respiratory disease in dental health care workers and patients.[1] Patients and health care workers may acquire respiratory infection in the dental environment through person-to-person contact (e.g., spread via airborne particles or droplet nuclei generated by sneezing, coughing or speaking). This route of transmission could be exacerbated by generation of aerosols through the use of dental handpieces or ultrasonic instruments during dental treatment. In addition, the water used to irrigate these devices harbours relatively high numbers of bacteria.[1] Several epidemiologic studies have demonstrated a greater prevalence of the bacteria that commonly colonize dental unit waterline (DUWL) biofilms in the nasal flora of dentists than nondental personnel (or greater prevalence of an immune response to these bacteria).[2–4] Although several

case reports have suggested that DWAs were the cause of infection,[5,6] another study found that the risk of respiratory infection for patients with cystic fibrosis (who often suffer from infection with *Pseudomonas*, a common inhabitant of dental waterlines) who were exposed to the dental environment was equal to the annual rate of respiratory infection for this population as a whole.[7] More recently, dental treatment has been associated with a hyperactive airway response that diminishes lung function in children with asthma.[8] Exposure to DWAs was offered as a possible explanation, but no evidence was offered in support of this hypothesis.

DWAs may be contaminated with bacteria transferred from patient microbial flora during the course of treatment or from DUWL biofilms. Microbial biofilms are ubiquitous on the inner surface of DUWL tubing.[9] The formation of these complex structures follows adhesion and growth of saprophytic bacteria normally found in potable water.[1,10–14] The bacteria secrete a polymeric substance (slime) that helps to anchor them to surfaces.[15] Although most of the biofilm remains attached to the internal surface of the waterline, single bacterial cells and aggregates of bacteria often become detached. Consequently, organisms can be carried in the effluent water via a dental handpiece, a sonic scaler or water spray. Concern has been expressed by both dental health care professionals and the lay media[16] that exposure to bacteria in DWAs may cause disease, particularly respiratory infections, in both patients and dental health care workers following inhalation of aerosols generated from high-speed handpieces or ultrasonic scalers.

Most bacterial species that colonize the oral cavity and form DUWL biofilms are not pathogenic. However, several potentially pathogenic bacteria, for example, *Pseudomonas* spp. and *Legionella pneumophila*, have been isolated from DUWLs.[6,17] In addition to harbouring bacteria, waterline effluents also contain high concentrations of biologically active bacterial products such as lipopolysaccharide,[18] which may have untoward effects on important physiologic processes such as wound healing.

To minimize the chance for patient infection from waterlines, the American Dental Association recommends that sterile irrigating solutions be used for surgical procedures and that dental instruments using DUWL water be run for 20 to 30 seconds before each patient and for several minutes at the start of each day to reduce the number of bacterial colony-forming units (CFUs) that exit in waterline effluents.[19] The 2003 guidelines for infection control in the dental setting of the Centers for Disease Control and Prevention (CDC) make the same recommendations.[20]

Other than the few case reports of serious infections that may have arisen from DWAs,[4,5] no epidemiologic investigations have demonstrated adverse health effects due to such exposures. In light of the paucity of research either supporting or refuting the possibility that exposure to DWAs induces disease, a study was designed to investigate this problem. Because the exposure of dental students to DWAs varies (first-year students having little exposure to such aerosols and fourth-year students and postgraduate residents having extensive exposure), the null hypothesis was that there is no difference in the prevalence of respiratory disease between senior dental students and more junior students. The goal of this study was to determine if the rates of respiratory illness among dental students and residents in 3 dental schools varies with school year (and hence exposure to the clinical dental environment).

Methods

The University at Buffalo Human Subjects Institutional Review Board approved the protocol for this study. A detailed questionnaire (see **Appendix 1** at http://www.cda-adc.ca/jcda/vol-70/issue-3/170.html) was administered to 817 dental students and postgraduate residents of 3 U.S. dental schools (The State University of New York at Buffalo, Buffalo, New York; Marquette University, Milwaukee, Wisconsin; and University of Southern California, Los Angeles, California) and to 26 dental hygiene students at the University of Southern California. Sample size calculations were based on the estimated average prevalence of pneumonia in the general population. The CDC estimates that pneumonia was the cause of 1.3 million hospital dicharges in 2001,[21] which suggests that the disease affects approximately 0.5% of the U.S. population. This is an underestimate of the true incidence of pneumonia, because many cases of this disease are either not treated, or treated and not hospitalized. Another recent study[22] found hospitalizations for community-acquired pneumonia for all Medicare recipients aged 65 years or older to be 18.3 per 1,000 population. Because our target population was much younger, we set the expected prevalence at 1%. We then assumed that a doubling of the prevalence of pneumonia (to 2%) would represent a significant difference in prevalence. The number of subjects required to detect a doubling in the rate of pneumonia, for a study with a power of 80% and 5% significance level, was calculated to be 793.

Data Analysis

For the preliminary analysis, history of respiratory disease within the past year was considered the dependent variable, and dental class (first, second, third or fourth undergraduate year or postgraduate studies) was considered the independent variable. Demographic and other variables, such as age, sex, race, life habits (smoking and alcohol consumption) and dental school attended, were used as covariates in this analysis.

Descriptive statistics and bivariate analysis (χ^2 test) were used to examine possible associations among the general characteristics of the population. Student's *t*-tests and

Table 1 Prevalence of respiratory condition by dental school

	No. (and %) of students				
School	**COPD**	**Bronchitis**	**Asthma[a]**	**Pneumonia**	**Streptococcal pharyngitis**
A (*n* = 238)	1 (0.4)	4 (1.7)	13 (5.5)	3 (1.3)	14 (5.9)
B (*n* = 349)	4 (1.1)	5 (1.4)	6 (1.7)	2 (0.6)	19 (5.4)
C (*n* = 230)	1 (0.4)	3 (1.3)	7 (3.0)	0 (0.0)	17 (7.4)

COPD = chronic obstructive pulmonary disease
[a]*Significantly greater prevalence of asthma in school A than in schools B and C.*

Table 2 Prevalence of respiratory condition by class year[a]

	No. (and %) of students				
Year	**COPD**	**Bronchitis**	**Asthma**	**Pneumonia**	**Streptococcal pharyngitis**
1st (*n* = 221)	4 (1.8)	1 (0.5)	9 (4.1)	2 (0.9)	13 (5.9)
2nd (*n* = 249)	1 (0.4)	5 (2.0)	4 (1.6)	0 (0.0)	17 (6.9)
3rd (*n* = 176)	0 (0.0)	2 (1.1)	6 (3.4)	0 (0.0)	7 (4.0)
4th (*n* = 149)	1 (0.7)	3 (2.0)	7 (4.7)	3 (2.0)	11 (7.3)
Postgraduate (*n* = 20)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (10.0)
Total (817)	6 (0.7)	11 (1.3)	26 (3.2)	5 (0.6)	50 (6.1)

COPD = chronic obstructive pulmonary disease
[a]*No statistically significant associations were noted between prevalence of any disease and class year.*

Table 3 Results of multiple logistic regression analysis for risk of respiratory disease (composite index)

Variable	Odds ratio	95% CI
Age	1.06	0.96–1.16
Sex		
Female	1.00	–
Male	0.82	0.43–1.57
Race		
Caucasian	1.00	–
Asian	1.23	0.58–2.62
Others	0.97	0.31–3.01
School		
A	1.00	–
B	0.55	0.26–1.15
C	0.49	0.22–1.10
Tobacco use		
No	1.00	–
Yes	0.74	0.23–2.32
Alcoholic drinks/week		
None	1.00	–
1–2	1.91	0.87–4.20
3–5	2.08	0.73–5.90
5–10	1.81	0.57–5.76
Exposed to dental drill		
No	1.00	–
Yes	1.06	0.57–1.95
Dental school year		
1st	1.00	–
2nd	0.50	0.21–1.18
3rd	0.50	0.20–1.23
4th	0.94	0.41–2.14

CI = confidence interval

analysis of variance were used to evaluate and compare the means of the parameters under study. All covariates were also considered in a logistic regression model.

Because of the low prevalence of respiratory disease in this population, a composite respiratory disease index was also constructed, which incorporated bronchitis, asthma, emphysema, chronic obstructive pulmonary disease (COPD, including history of chronic bronchitis or emphysema or both) and pneumonia.

Results

Of the 817 respondents, 512 (62.7%) were male; 238 (29.1%) were enrolled at school A, 349 (42.7%) at school B and 230 (28.2%) at school C.

Table 1 details the prevalence of respiratory illness among the respondents from each school. The only statistically significant association was for asthma, for which there was a significantly higher prevalence at school A than at schools B and C. Streptococcal pharyngitis was the most prevalent respiratory disease, and pneumonia the least prevalent. The inquiry about history of streptococcal pharyngitis was used as a "control" question, because there is no evidence of a link between the acquisition of this infection and exposure to the dental environment.

No statistically significant association was observed between prevalence of any of the respiratory diseases and class year (**Table 2**).

To assess the relation between respiratory disease and exposure of dental students to dental aerosols, the 26 dental hygienists were excluded from the multiple logistic regression analysis, and the analysis controlled for a variety of

potential confounders, including age, sex, race, school, tobacco use, alcohol use, exposure to a dental drill and dental school class. No statistically significant association was found between any of the target respiratory conditions alone and year in dental school or exposure of the students to dental aerosols as a dental patient. No correlations were noted between the composite respiratory disease index and any of the covariates assessed (**Table 3**).

Discussion

The goal of this study was to determine if a correlation exists between exposure to DWAs and respiratory illness in healthy dental students. The results do not indicate any such relationship. This outcome suggests that the microbial species resident in DWAs are inherently nonpathogenic, especially for healthy individuals, despite their abundance in the oral cavity and in DUWL aerosols. Current infection control procedures, including the now-routine use of barriers such as gloves and masks in dental practice, probably prevent transmission of aerosol-borne disease in healthy populations.

Bacterial counts in water samples from DUWLs can be quite high, sometimes exceeding 1 million CFU/mL effluent. These high bacterial counts are probably related to the large surface area to volume ratio of the waterlines and the low flow velocities therein, which allow planktonic bacterial cells ready access to the tubing wall where they can form biofilms.[1] Previous studies have found potential pathogens such as *Pseudomonas aeruginosa, L pneumophila* and nontubercular mycobacteria in DUWL biofilms.[6,7,17,23,24] Although *Pseudomonas* spp. from DUWLs may be a source of infection in patients with cystic fibrosis, the apparent risk of such a patient acquiring this organism from DUWL biofilms is low. Amoebae have also been found in DUWL effluents.[25] Despite the presence of potential pathogens within DUWLs, there is little published evidence to support the contention that exposure to DWAs is a risk factor for respiratory or other diseases. The results of the present study also do not support the notion that increased exposure to the dental workplace increases the prevalence of respiratory diseases.

Streptococcal pharyngitis is a common infection caused by group A beta-hemolytic streptococci. There is no evidence that these streptococci reside in DUWL biofilms. As expected, the present study found no correlation between exposure to DUWL and streptococcal pharyngitis.

It was assumed that all of the subjects enrolled in this study were healthy individuals with normal immune function. There is at present little published epidemiologic evidence to support an association between exposure to DWAs and the prevalence of respiratory disease in immunocompromised individuals, but this possibility should be the subject of further investigation.

Conclusions

The results of this study do not support an association between dental school year (and hence exposure to the dental environment) and the prevalence of respiratory disease. It can be concluded that short-term exposure of healthy dental health care workers to DWAs is not associated with an increased risk of respiratory disease. Similar studies in immunocompromised individuals are warranted to determine if such an association exists in those populations. ◆

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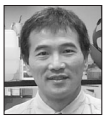
Dr. Scannapieco *is professor, department of oral biology, School of Dental Medicine, University at Buffalo, The State University of New York, Buffalo, New York.*

Mr. Ho *is statistician, department of oral biology, School of Dental Medicine, University at Buffalo, The State University of New York, Buffalo, New York.*

Ms. DiTolla *is a dental student, School of Dental Medicine, University at Buffalo, The State University of New York, Buffalo, New York.*



Dr. Chen *is associate professor and chair, division of primary oral health care, School of Dentistry, University of Southern California, Los Angeles, California.*

Dr. Dentino *is associate professor and chair, division of periodontics, School of Dentistry, Marquette University, Milwaukee, Wisconsin.*

Correspondence to: *Dr. Frank A. Scannapieco, 109 Foster Hall, School of Dental Medicine, University at Buffalo, The State University of New York, Buffalo, NY 14214. E-mail: fas1@acsu.buffalo.edu.*

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Diagnostic Challenge

The Diagnostic Challenge is submitted by the Canadian Academy of Oral and Maxillofacial Radiology (CAOMR). The challenge consists of the presentation of a radiology case.

Since its inception in 1973, the CAOMR has been the official voice of oral and maxillofacial radiology in Canada. The Academy contributes to organized dentistry on broad issues related to dentistry in general and issues specifically related to radiology. Its members promote excellence in radiology through specialized clinical practice, education and research.

CAOMR Challenge No. 13

Gurminder Sidhu, BDS
Axel Ruprecht, DDS, MScD, FRCD(C)

A 50-year-old woman presented with longstanding progressive enlargement of the head.

The patient had been treated for a hip fracture one year previously. Her other medical history was noncontributory. The dental history revealed routine dental treatment. Upon examination, the skull appeared to be enlarged and showed frontal bossing. There was no tenderness, lymphadenopathy or crepitus of the temporomandibular joint upon extraoral palpation. Intraoral examination revealed no significant findings.

A pantomograph (**Fig. 1**) showed loss of normal trabecular pattern and the appearance of irregular osteoblastic activity, giving rise to the "cotton wool" appearance in the maxilla. There was hypercementosis of the maxillary first premolars.

The lateral cephalometric skull radiograph (**Fig. 2**) showed multiple small discrete radiopaque areas consistent with a cotton wool appearance throughout the cranial bones. Thickening of the diploë was visible.

A standard maxillary occlusal radiograph (**Fig. 3**) showed bone deposition on the right side but no encroachment on the maxillary sinuses. Hypercementosis was also seen on the maxillary right canine.

What is your interpretation?

Figure 1: *Pantomograph showing loss of normal trabecular pattern and irregular osteoblastic activity giving rise to a cotton wool appearance in the maxilla. There is hypercementosis of the maxillary first premolars.*

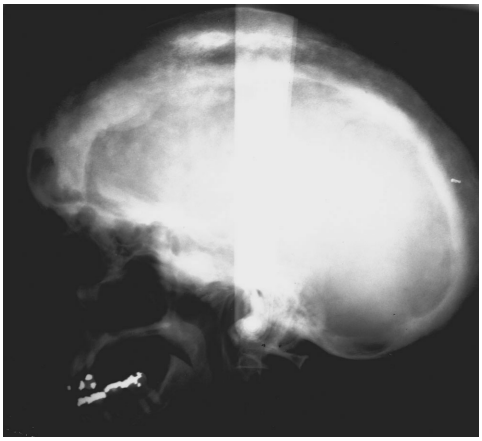

Figure 2: *The lateral cephalometric skull radiograph shows multiple small radiopaque areas consistent with a cotton wool appearance throughout the cranial bones, and thickening of the diploë.*

Figure 3: *A standard maxillary occlusal radiograph showing bone deposition on the right side but no encroachment on the maxillary sinuses. Hypercementosis can also be seen on the maxillary right canine.*

(See page 178 for answer)

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Answer to CAOMR Challenge No. 13

Osteitis deformans (also called Paget's disease of bone) was first described in 1876 by Sir James Paget, a well-known English surgeon, at a meeting of the Royal Medical and Chirurgical Society. Paget's disease of bone should not be confused with Paget's disease of the breast and of the vulva, which are malignant diseases that also bear the discoverer's name.

Although the diagnosis is usually made after the age of 50, osteitis deformans can affect individuals as early as in the second decade of life. There is no sex predilection, but family history may be positive for the disease in up to 40% of patients.

Osteitis deformans is a chronic, localized, monostotic or polyostotic disease characterized by increased bone remodelling, bone hyperplasia, and abnormal bone structure that may lead to pain and bone deformity.[1] The bone is laid down without reference to function or load bearing. Pagetic bone is characterized by disorganization in both the architecture and lamellar texture of bone.

The most characteristic radiographic feature of osteitis deformans is the localized enlargement of bone due to overproduction of bone of poor quality. Osteoporosis circumscripta in the skull (**Fig. 2**), a circumscribed osteolytic area, is one of the earliest presenting signs. An example from another patient (**Fig. 4**) is shown for clarification. Cortical thickening, sclerotic changes and osteolytic areas (V-shaped lesions in long bones) are the other radiographic features found early in the disease. The maxilla is involved more often than the mandible. Poorly defined areas of osteoporosis may be noted, but of more diagnostic significance is the loss of normal trabeculation and the appearance of irregular osteoblastic activity giving rise to the typical cotton wool appearance. The disease is usually bilateral, but early in its course the radiographic findings may show unilateral involvement, making it difficult to differentiate the disease from chronic, diffuse, sclerosing osteomyelitis. The alveolar ridge becomes widened and the palate becomes flattened. Some of the teeth may show hypercementosis, loss of a well-defined lamina dura and, rarely, root resorption.

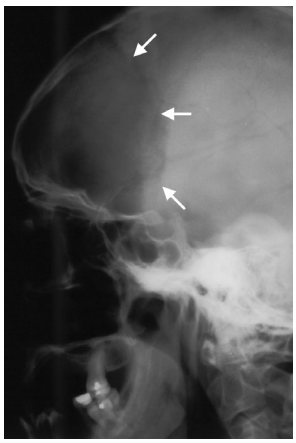

Figure 4: *Lateral skull radiograph (from another patient). The arrows point to an osteolytic area in the skull know as osteoporosis circumscripta.*

Complications include pathologic fractures, skeleton deformities, and auditory and visual disturbances. The most serious complication is development of osteosarcoma. Other complications depend on which bones are involved. Paget's disease of the temporal bone may result in hearing loss. Involvement of the spine may cause spinal cord compression. In the lower limbs, involvement of the long bones may cause fracture, and involvement of the hip or knee may cause secondary osteoarthrosis.[2]

Laboratory tests show no change in serum calcium and serum phosphorous levels, but markedly elevated serum alkaline phosphatase, especially when the disease is in the osteoblastic phase.[3] Radionuclide bone scanning with Tc-99 is the most reliable means of identifying pagetic lesions and should be performed at the time of diagnosis.

There is no specific treatment for Paget's disease, but promising results have been shown using specific inhibitors of osteoclast-mediated bone resorption such as calcitonin, plicamycin and etidronate, and, more recently, more potent bisphosphonates such as alendronate and pamidronate. A newer treatment with risedronate has proven to be effective in providing pain relief.[4]

The differential diagnosis includes fibrous dysplasia of bone, hyperparathyroidism with bone involvement, subacute osteomyelitis, osteosarcoma and disseminated neoplasms such as metastatic carcinoma or multiple myeloma.

Dr. Sidhu *is a second-year resident in oral and maxillofacial radiology, The University of Iowa, Iowa City, Iowa.*

Dr. Ruprecht *is professor and director, oral and maxillofacial radiology, professor of radiology, and professor of anatomy and cell biology at The University of Iowa, Iowa City, Iowa.*

Correspondence to: *Dr. Gurminder Sidhu, The University of Iowa-DSB, Iowa City, IA 52242-1001, USA. E-mail: gurminder-sidhu@uiowa.edu.*

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Clinical Abstracts

The Clinical Abstracts section of JCDA *features abstracts and summaries from peer-reviewed dental publications. It attempts to make readers aware of recent literature that may be of interest to oral health care workers. It is not intended to provide a systematic review of the topic. This month, the articles have been selected by Dr. David A. Scott and Dr. Jean-Pierre Picard. Dr. Scott is an assistant professor in the department of oral biology and the department of dental diagnostics and surgical sciences at the faculty of dentistry, University of Manitoba, and a scientist at the Manitoba Institute of Child Health. Dr. Picard is a specialist periodontist currently serving in the Canadian Forces.*

Commentary

Treatment of Periodontitis in Tobacco Smokers

David A. Scott, PhD; Jean-Pierre Picard, DDS, M Dent (Perio)

Tobacco smokers, who comprise 17% to 30% of the adult Canadian population (depending on the province), represent a major subgroup of patients in dental practice with specific needs. A strong association between tobacco smoking and increased incidence and severity of periodontitis, coupled with poorer treatment response, is well established. However, the mechanisms that predispose smokers to periodontitis have yet to be fully elucidated. It is possible that smokers may require alternative treatment regimens. This month's selection of clinical abstracts has been chosen to highlight recent advances in our understanding of the efficacy of antibiotics in the treatment of periodontitis, specifically in habitual smokers. Important new insights into tobacco–microflora and tobacco–gene interactions that may partly explain susceptibility to periodontal disease in smokers are also discussed. ◆

1 Can the aggressive use of antimicrobials improve the poor response to guided tissue regeneration noted in tobacco smokers with Class II furcation defects?

Machtei EE, Oettinger-Barak O, Peled M. Guided tissue regeneration in smokers: effect of aggressive anti-infective therapy in Class II furcation defects. *J Periodontol* 2003; 74(5):579–84.

Background

A substantial body of evidence suggests that there is a reduced regenerative response to guided tissue regeneration (GTR) in smokers, compared to nonsmokers. One study has estimated that 80% of failures occur in smokers. It is also known that antibiotic therapy can improve GTR outcome in the general population. The purpose of this investigation was to evaluate a new protocol with a strong emphasis on anti-infective therapy in tobacco smokers requiring GTR procedures to treat mandibular Class II furcation defects.

Methods

Patients who were smokers (≥ 10 cigarettes/day) and who had chronic periodontitis were randomly assigned to an experimental group (EG; $n = 19$; scaling and root planing; application of membrane plus 25% metronidazole gel; flap closure; twice daily 0.2% chlorhexidine rinse while membrane in position; 100 mg doxycycline per day for 1 week; 400 mg ibuprofen 4 times per day for 1 week; plus topical application of 25% metronidazole gel at weekly prophylaxis visits) or a control group (CG; $n = 19$; treatment as per the EG, but with no 25% metronidazole gel applications and with biweekly prophylaxis visits). Key clinical measures (probing depth, furcation width, vertical attachment level, horizontal attachment level) were evaluated over 12 months.

Results

At 12 months no significant differences in probing depth or horizontal attachment levels were noted. However, in the EG, reduced recession (+0.04 vs. –0.75 mm, $p < 0.05$) coupled with greater gain in vertical attachment levels (+1.68 vs. +0.90 mm, $p < 0.05$) were observed. Alveolar measurements also showed an improved response (distance from mid cemento-enamel junction to crest: +0.82 vs. –0.33 mm, $p < 0.001$; furcation width reduction: +0.61 vs. –0.22 mm, $p < 0.05$). Furthermore, less osteoid tissue was lost and a greater percentage turned into bone at 12 months in the EG.

Clinical Significance

Smoking compromises tissue maturation and mineralization in patients undergoing GTR therapy. However, extensive antimicrobial therapy, including the application of a 25% metronidazole gel, can improve GTR outcome in smokers. These results imply that it may be appropriate to include an anti-infective strategy in the treatment plan for smokers requiring GTR for mandibular Class II furcation defects. ◆

2 Are minocycline microspheres efficacious among tobacco smokers with chronic periodontitis?

Paquette D, Oringer R, Lessem J, Offenbacher S, Genco R, Persson GR, and others. Locally delivered minocycline microspheres for the treatment of periodontitis in smokers. *J Clin Periodontol* 2003; 30(9):787–94.

Background

Minocycline is a broad-spectrum antibiotic that can also inhibit the activity of endogenous matrix metalloproteinases. Previous studies have shown that locally delivered minocycline can result in a significant decrease in specific periodontal pathogens and, when combined with scaling and root planning (SRP), is a more effective treatment for periodontitis than SRP alone. This paper examined the efficacy of minocycline as an adjunctive treatment for periodontitis in smokers.

Methods

In a blinded, controlled, multicentre study, 90 randomized self-reported smokers with periodontitis received, as an adjunct to SRP, 1 mg minocycline hydrochloride microencapsulated in 3 mg of a bioresorbable polymer subgingivally at all periodontal pockets ≥ 5 mm. Ninety subjects were also randomized to receive SRP plus vehicle (polymer without minocycline), and a further 91 to receive SRP alone. Minocycline or vehicle was administered at baseline, 3 and 6 months to appropriate patients, and treatment efficacies (change in probing depth) evaluated at 1, 6 and 9 months.

Results

At 1 month, smokers treated with SRP plus minocycline exhibited significantly larger probing depth reductions (1.1 mm), compared to SRP plus vehicle (0.9 mm) or SRP alone (0.9 mm). Improved periodontal health was maintained over the length of the study in the treatment group (+1.2 mm), compared to SRP plus vehicle (+0.9 mm) and SRP alone (+0.9 mm). Treatment was particularly successful in male smokers > 50 years old, with 60% more pockets responding to SRP plus minocycline with pocket depth reductions ≥ 2 mm over 9 months. Secondary outcome measures (clinical attachment level and bleeding on probing) also showed improvement in the SRP plus minocycline group, compared to the other groups or baseline measurements. However, the differences were statistically insignificant.

Clinical Significance

The local delivery of minocycline to periodontal pockets ≥ 5 mm, as an adjunct to SRP, is more efficacious than SRP alone. However, adjunctive minocycline microsphere treatment in tobacco smokers results in a treatment response which is similar to that of nonsmokers treated with SRP alone. As the authors point out, clinicians should always emphasize the importance of quitting to patients who smoke. ➧

3 Is there a microbiological basis for an increased susceptibility to periodontitis in tobacco smokers?

Van der Velden U, Varoufaki A, Hutter JW, Xu L, Timmerman MF, Van Winkelhoff AJ, and other. Effect of smoking and periodontal treatment on the subgingival microflora: a retrospective study. *J Clin Periodontol* 2003; 30(7):603–10.

Background

Several studies have demonstrated that smoking can compromise the response to periodontal therapy. One suggested mechanism affecting response is the involvement of a more periodontopathogenic microflora in smokers. However, the evidence of such an association is at best conflicting. Some studies have shown that cigarette smoking may increase the likelihood of subgingival infection with specific periodontal pathogens, while others have failed to show any significant differences in the periodontal microflora of smokers and nonsmokers. The present study investigated the impact of smoking and periodontal therapy on the composition of the subgingival microflora.

Methods

This retrospective study involved 59 subjects who had completed active periodontal therapy within the previous 2 years and received maintenance care every 3 months. Thirty were smokers and 29 nonsmokers. Clinical measurements included bleeding index, pocket probing depth and clinical attachment loss. Microbiological assessments were done at the deepest pocket of each quadrant before and after therapy. The presence and proportion of the target microorganisms (*Actinobacillus actinomycetemcomitans, Porphyromonas gingivalis, Prevotella intermedia, Bacteroides forsythus, Fusobacterium nucleatum* and *Peptostreptococcus micros)* were analyzed. The levels of plasma cotinine were determined as an accurate dose-dependent marker of recent tobacco smoke exposure. Treatment groups included initial

therapy only, initial therapy with antibiotics, initial therapy followed by surgery, and initial therapy with antibiotics and surgery.

Results

All clinical parameters improved in both smokers and nonsmokers following treatment. No significant differences in bleeding on probing and pocket depth reduction were observed between smokers and nonsmokers. However, nonsmokers showed significantly more gain of clinical attachment than smokers after therapy. No differences were reported in the prevalence of the target bacteria between smokers and nonsmokers before treatment. In nonsmokers, the prevalence of all studied bacteria decreased significantly after treatment. In contrast, only the prevalence of *Porphyromonas gingivalis* decreased in smokers after therapy, while smoking increased the likelihood of remaining positive for *Prevotella intermedia, Fusobacterium nucleatum* and *Peptostreptococcus micros.*

Clinical Significance

The decreased response of the smokers' microbiota to therapy may partly explain the often unfavourable treatment results in smokers with periodontitis. These results once again support the validity of informing our patients of the benefits of quitting smoking and facilitating cessation. ➧

4 Is there a genetic basis for the increased susceptibility to periodontitis in tobacco smokers?

Meisel P, Heins G, Carlsson LE, Giebel J, John U, Schwahn C, and other. Impact of genetic polymorphisms on the smoking-related risk of periodontal disease: the population-based study SHIP. *Tobacco Induced Dis* 2003; 1(3):197–206.

Background

Not all individuals are equally susceptible to periodontitis, a chronic inflammatory disease. Genetic and environmental factors contribute to individual susceptibility. Smoking is recognized as a major environmental risk factor for periodontitis. This study examined the relationship between tobacco smoke exposure, polymorphisms in key immune/inflammatory genes, and severity of periodontitis.

Methods

For this study, 1,083 randomly selected individuals from Germany participating in a population-based cross-sectional health survey were successfully genotyped for polymorphisms. Genomic DNA was extracted from peripheral leukocytes and polymorphisms in interleukin-1A (IL-1A), IL-1B, myeloperoxidase (MPO), N-acetyltransferase (NAT-2), and the FcγRIIIb gene were determined by polymerase chain reaction and restriction fragment length differences. Genotype was related to smoking history and periodontal health (probing depth, attachment loss, bleeding index, plaque index, and tooth loss).

Results

As expected, a clear dose-dependent relationship between smoke exposure histories (pack years) and the severity of periodontitis (attachment loss and tooth loss) was demonstrated. This association was independent of age. Smokers who were heterozygous or homozygous for the FcγRIIIb-NA2 (the product of this gene has a low affinity for IgG, a key class of antibody in the maintenance of periodontal health) showed significantly increased attachment loss, compared to genotype-matched nonsmokers (**Fig. 1**). Similarly, subjects with at least one variant IL-1 allele (associated with enhanced interleukin

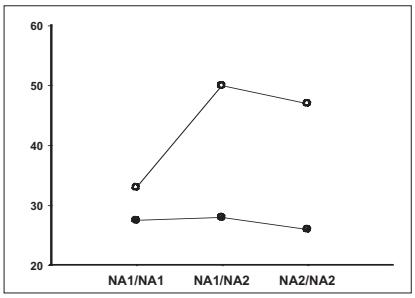

Figure 1: *Percent attachment loss ≥ 4 mm among smokers (open circles) and nonsmokers (filled circles) separated according to their Fcγ-RIIIb genotypes NA1/NA1, NA1/NA2 or NA/2NA2. Kruskal-Wallis test results:* p = *0.024 and* p = *0.797 for smokers and nonsmokers, respectively. (Adapted with permission.)*

production) and who smoked exhibited increased attachment loss. Likewise, variant NAT-2 alleles (rapid metabolism of tobacco smoke components) and variant MPO alleles (diminished MPO production) were associated with increased severity of periodontitis in smokers only. The odds ratio for having 30% of sites with attachment loss > 6 mm was 7.0 (3.3–15.2) and 4.0 (2.2–7.0) for smokers with variant NAT2 and MPO alleles, respectively.

Clinical Significance

This study supports the hypothesis that genetic polymorphisms in specific immune/inflammatory genes increase susceptibility to periodontitis in tobacco smokers. While it is still unclear whether genetic profiling will significantly alter clinical practice, these results highlight the need for dental health professionals to explain to their patients the profound risk of smoking to their oral and systemic health, and to encourage and facilitate smoking cessation. ➧

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Point of Care

The Point of Care section of JCDA *answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. Readers are encouraged to do more reading on the topics covered. This month's responses were provided by speakers at the 2004 Ontario Dental Association Annual Spring Meeting, which will take place in Toronto, Ontario, from May 6 to 8. For more information on the meeting, visit www.oda.on.ca. If you would like to submit or answer a question, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.*

Question 1

Following removal of a maxillary anterior tooth, what is your preferred method of provisionalization in preparation for an implant restoration?

The esthetic placement of a prosthetic tooth is highly influenced by the provisional restoration placed at the time of extraction. The provisional restoration must be inserted immediately following tooth removal to conserve the hard and soft tissues and to provide labial gingival tissue fullness and support to the papillae.

Provisional restorations may be removable or fixed and must be tooth-supported.[1,2] To ensure that the occlusion is not disturbed, it is usually necessary to remove tooth structure or restorative material in order to provide occlusal rest areas for a removable restoration, or to achieve retention for the fixed provisional restoration. This small biologic cost is outweighed by the enhanced esthetic results. To conserve the tissues, the functional forces must be applied to the teeth and not to the tissues, which would cause tissue loss and collapse.

My preferred method of provisionalization is the fixed provisional restoration, using an acrylic denture tooth affixed to the adjacent teeth.

Procedure Highlights

1. Select an appropriate acrylic denture tooth as a replacement pontic for the tooth to be removed.
2. Measure the length of the tooth to be extracted from the incisal edge to the gingival crest and add 3 mm.
3. Atraumatically remove the tooth (**Figs. 1** to **3**).
4. Sculpt and shape the replacement acrylic pontic to fit esthetically into the edentulous region and extend 3 mm into the fresh extraction socket. It may be necessary to add self-cure acrylic to the gingival aspect of the pontic to obtain the clinical length plus 3 mm subgingival extension (**Figs. 4** and **5**). Shape the subgingival extension to resemble the extracted tooth's root form. The apical end should be egg-shaped, convex in all directions and highly polished. This subgingival extension will support the soft tissues (as did the natural tooth) and will provide the same labial fullness and papilla support. The extension will have an ovate pontic form.[3]
5. Roughen the proximal contact areas of the pontic and cut Class III preparations into the mesial and distal contact areas.
6. Using a #35 high-speed bur, cut 2 small Class III restorations into the contact areas of the adjacent teeth. If the tooth surfaces are intact, attempt to keep the preparations entirely in the enamel. If restorations are present, the preparations should be within the restorations.
7. Etch the proximal tooth surfaces.
8. Wet the etched tooth surfaces and the proximal pontic surfaces with methylmethacrylate monomer.
9. Apply self-curing acrylic to the 4 adjacent prepared and wetted regions. Acrylic — and *not* composite — should be used. Self-curing acrylic bonds to the acrylic denture tooth, is flexible, and will not crack and cause the pontic to dislodge with the slight movement of the supporting teeth.
10. Place the pontic into the socket in its proper orientation and extending 3 mm subgingivally, with the soft unset acrylic blending at the contact areas.
11. Hold the pontic in position until the acrylic has sufficiently set to maintain its position (**Fig. 6**). It may be necessary at this point to add more acrylic to the contact areas.

Figure 1: *Tooth 12, with a history of trauma, endodontic therapy, apical surgery, an apical fistula and a vertical root fracture, needs removal.*

Figure 2: *Labial fistula over the apex of the tooth.*

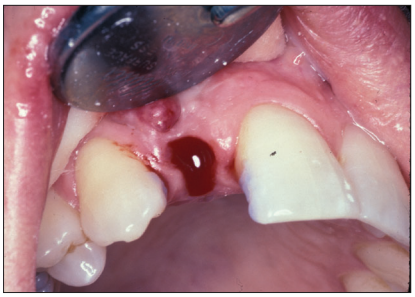

Figure 3: *Tooth atraumatically removed.*

Figure 4: *The acrylic denture tooth has been shaped and self-cure acrylic added to the apical end to form an ovate pontic, which will extend 3 mm subgingivally.*

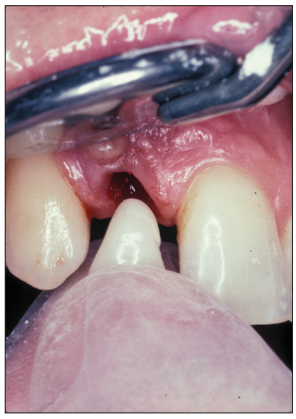

Figure 5: *The sculpted ovate acrylic pontic is being positioned 3 mm into the extraction socket.*

Figure 6: *The ovate pontic is bonded to the adjacent teeth with self-cure acrylic on the day of extraction. The pontic is providing support to the papillae and the labial tissue, as did the original tooth.*

12. Contour the acrylic when it has fully set and adjust occlusion. A light centric contact and no contact in eccentric position is desired.
13. To allow surgical and restorative procedures, the pontic can be readily removed using a plastic medium-grit, safe-sided sandpaper disc, with the safe side adjacent to the teeth. Once the procedure is completed, the pontic can again be bound with self-cure acrylic.
14. Upon osseointegration of the implant fixture, restore the proximal preparations on the adjacent teeth with composite and use an implant-supported provisional restoration.

This fixed provisional restoration maintains tissue fullness and papilla height because of the root form extension into the socket. If at the time of extraction there is an absence of proximal bone or labial plate, the tissues will recede with time and may require reconstruction. ➧

Dr. Robert David *is an associate professor at McGill University and practises restorative and implant dentistry in Montreal, Quebec. E-mail: bobbydavid @sympatico.ca.*

Dr. David and Dr. Fredrick Muroff will be presenting "A Team Approach to Periodontal, Implant and Restorative Procedures for Gingival Aesthetics" on Thursday, May 6.

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2. Lai JY, Birek P. A simple post-extraction technique for the preservation of the soft tissue architecture leading to a favorable cosmetic outcome for implant prosthodontics. *Oral Health* 1999; 19–21.

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Question 2 How should I manage acute limitation of jaw motion and pain after a dental procedure?

Acute limitation of mandibular motion after a dental procedure is most commonly caused by:

- elevator muscle strain;
- myositis associated with needle injury (resulting from mandibular block injections that enter the medial pterygoid muscle);
- articular disc displacement (ADD), which occurs when the disc physically obstructs normal mandibular movement.

While most dental procedures involve little or minimal postoperative discomfort, a small percentage of patients may experience discomfort that becomes severe enough to disrupt jaw function and cause pain, as well as considerable anxiety and stress.

It may be 1 or more days before the patient contacts the dentist to report symptoms that are not expected or not resolving. Because these symptoms are unexpected consequences of a procedure, the patient is often anxious and may feel that something was wrong with the way treatment was delivered. It is important to address the complaints as soon as they are reported. Effective communication can reduce anxiety that is often responsible for amplifying pain and increasing emotional distress.

Most of these postoperative problems relate to elevator muscle strain that can usually be managed medically over the course of 2 weeks without residual impairment or disability. Depending on the severity of the condition, myositis and muscle injury resulting from the anesthetic injection can be associated with fibrosis and a more persistent loss of mandibular motion. Articular disc displacement restricting jaw motion is a more persistent problem and usually does not resolve quickly.

The general approach to management should include:

1. arranging for the patient to return to the office as soon as possible;
2. performing an assessment to establish the most likely cause of the symptoms;
3. recommending a treatment plan that includes a time frame regarding expected results;
4. monitoring treatment and progress closely through frequent phone contact or office visits;
5. referring the patient for a second opinion or for further treatment if the patient expresses anger, emotional distress or loss of confidence; and
6. referring the patient if your treatment is not working and you are uncertain why or whether the diagnosis is correct.

Patient Assessment

The following are some diagnostic clues that may help arrive at a diagnosis.

Elevator muscle strain:

- Maximum mouth opening is restricted but lateral mandibular movements are usually normal.
- Pain is often minimal or absent when the mandible is at rest.
- Assisted opening is greater than 5 mm compared to maximum unassisted opening. (To measure assisted opening, have the patient open as wide as possible, place the thumb on the maxillary central incisors and cross the index finger to the mandibular central incisors, apply moderate pressure without forcing the jaw and measure the interincisal distance.)

Myositis due to needle injury:

- Pain tends to be severe and is usually present when the jaw is at rest.
- The range of movement can be severely limited (sometimes less than 10 mm), making a thorough intraoral examination difficult or impossible.
- The extent of the limitation may not occur immediately but may increase during the several days after the procedure.
- Chewing ability can be severely limited, with the patient often reporting only being able to consume liquids.

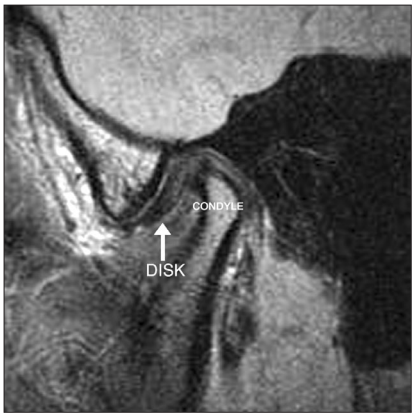

Figure 1: *Magnetic resonance imaging of the mouth in the closed position showing the articular disc displaced anteriorly.*

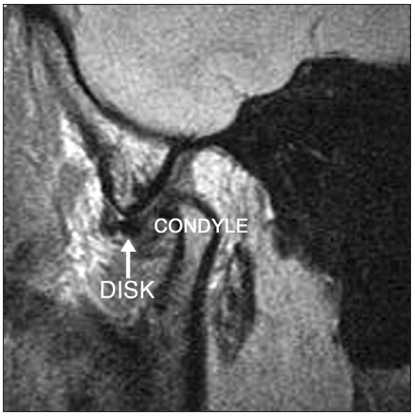

Figure 2: *Magnetic resonance imaging of the mouth in the open position showing the disc remaining forward and not returning to a position between the 2 articulating surfaces.*

Articular disc displacement:

- Pain may be mild and limited to attempts to force the opening further.
- Mandible characteristically deviates to the affected side on opening.
- Mandibular movement to the opposite side is usually restricted.
- The mandibular condyle on the affected side is usually not palpable due to the lack of translation.
- Maximum assisted mouth opening is usually less than 5 mm.
- Magnetic resonance imaging can confirm this diagnosis (**Figs. 1** and **2**).

Patient Management

The initial treatment strategy is to control pain, followed by a re-evaluation of mandibular motion. In some cases, especially if the diagnosis is elevator muscle strain, mandibular motion will return to normal and no further treatment will be necessary. When limitation persists, physiotherapy — including muscle stretching and joint mobilization, combined with home exercises that focus on increasing the range of jaw motion — is indicated.

To control pain:

- soft diet, heat applications, rest for the jaw;
- muscle relaxant medication (e.g., cyclobenzaprine, 5–10 mg at bedtime);
- analgesic medication such as a nonsteroidal anti-inflammatory drug (e.g., rofecoxib, 25 mg per day), or occasionally, in cases where myositis is present, a combination opioid with aspirin or acetaminophen may be required for short periods;
- physiotherapy, including massage and gentle stretching, as well as passive modalities such as ultrasound, heat, laser and transcutaneous electrical nerve stimulation (TENS).

After pain is reduced, if limited motion persists, a decision about active treatment to regain jaw motion can be made.

Significant limitation of jaw motion with pain persisting after a dental procedure may cause great anxiety and distress for the patient. To manage the condition successfully, treatment requires an active management plan that includes communication, reassurance and scheduled follow-up assessment. ◆

Dr. Bruce Blasberg *is a certified specialist in oral medicine. He maintains a private practice in Vancouver, B.C., and is the director of the Orofacial Pain Program at Vancouver General Hospital. E-mail: b.blasberg @shaw.ca.*

Dr. Blasberg's seminar "Diagnosis and Management of Temporomandibular Disorders (TMD) for the Dental Practitioner" will be presented on Friday, May 7.

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Question 3

When instrumenting canals, does it really matter what size the canal is instrumented to? Should I aim to instrument to a large or a small master apical file?

In recent years, the trend in endodontics has been towards simplifying and speeding up the instrumentation and obturation of canals. Dental companies have concentrated their marketing efforts on one message: it can now take fewer files, less time and less effort to completely instrument canals. In fact, some of the newer and more popular rotary nickel titanium (NiTi) files do not even come in sizes larger than 30. Unfortunately, as is often the case, technology and clever marketing are dictating treatment instead of science.

The fundamental goal of endodontic treatment is to clean and debride canals and to eliminate intraradicular infection to achieve an aseptic intracanal field. This is achieved by 2 means: mechanical instrumentation with files and chemical disinfection with irrigating solutions such as sodium hypochlorite. These processes work concurrently to remove vital and necrotic tissue, bacteria, bacterial byproducts and dentinal debris created during instrumentation.

To determine final file size, one needs to keep in mind the size of the canal treated. If the goal is to clean and debride the canal, then the master file needs to be just slightly larger than the canal itself. In fact, evidence indicates that endodontic instrumentation should remove not only intracanal tissue and debris, but also part of the dentin wall surrounding the pulp. Because dentinal tubules are in direct communication with the pulp, any contaminants in the pulp will penetrate the dentin. Hence the need to remove as much of the affected dentin as possible. Underinstrumentation (**Figs. 1** to **3**) will result in

incomplete tissue or bacteria removal from inside the canal and surrounding dentin. The concept of removing all that is contaminated is a fundamental one, yet is all too often overlooked when deciding how to instrument.

No natural canal is perfectly round when examined in cross-section. Most canals are naturally oval and have anatomical aberrations, such as isthmuses or accessory canals that also need to be debrided. The file that is used should be large enough not only to debride the main canal, but also to mechanically instrument these aberrations. Anything less will leave behind undesirable tissue. For example, if the natural apical canal size of a maxillary lateral incisor is about 0.5 mm (equivalent to a size 50 file), then the master file size should be just correspondingly larger.

In addition to mechanical instrumentation, one needs to remember the significance of intracanal irrigation and disinfection with a solution such as sodium hypochlorite. Practitioners often forget or overlook the fact that canal irrigation with the use of irrigating needles is directly dependent on the size of the instrumented canal. With endodontic side-venting needles, the irrigant will go only about as far into the canal as the tip of the needle. The needle can only be placed apically as far as the instrumented canal will allow. That's just simple physics. In an underinstrumented canal, the needle and the irrigant will not reach the full length of the canal. This is one more reason to instrument larger.

Marketers' sales pitch of instrumenting with fewer files to a relatively small apical size in order to save time and effort means that the fundamental goal of endodontic treatment cannot be adequately achieved. Unfortunately, this can only lead to higher rates of clinical failure.

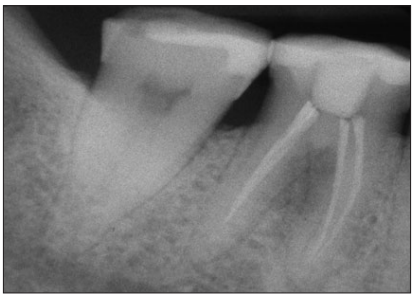

Figure 1: *Failed root canal treatment. The canals had been underinstrumented.*

Figure 2: *The tooth was successfully retreated and instrumented to a larger size.*

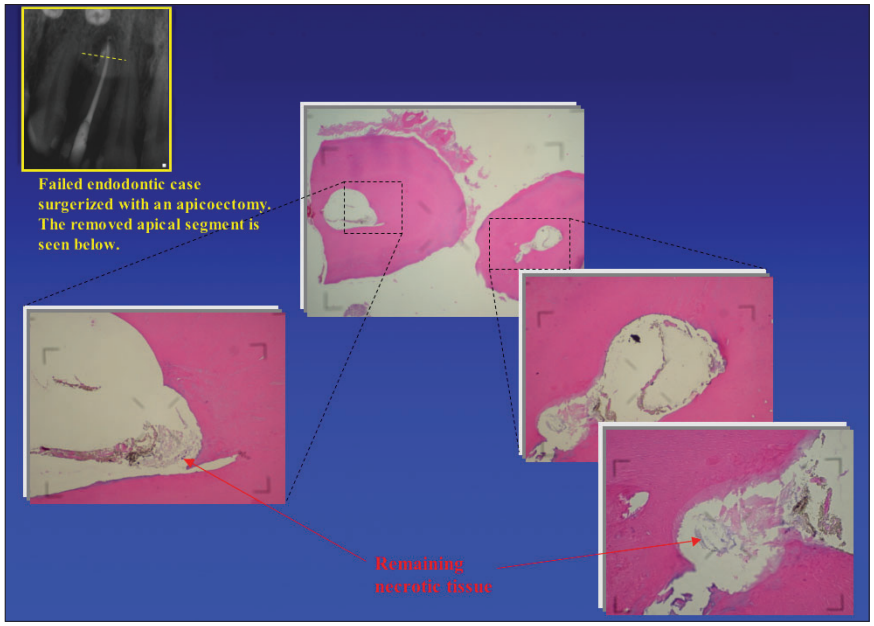

Figure 3: *Histological cross-section of an underinstrumented canal with necrotic pulp left behind.*

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Dr. Manor Haas *is an oral and maxillofacial surgeon with a private practice limited to endodontics and microsurgery in Toronto, Ontario. He is a lecturer and clinic instructor at the University of Toronto's graduate and postgraduate endodontic departments. He is also on staff at Toronto's Hospital for Sick Children. E-mail : haasendo@mac.com.*

Dr. Manor's seminar "Advances in Clinical Endodontics: What's New, What's Worth It, and How It May Enhance Your Endodontics!" will be presented on Friday, May 7.

Question 4

What is the cause of apical migration of the soft tissue attachment and subsequent alveolar bone resorption around an anterior implant within the first year of placement in the absence of peri-implantitis?

In an attempt to create an ideal emergence profile, implants are often placed 3–4 mm below the cemento-enamel junction of the adjacent teeth and traditionally countersunk below the crestal bone. Initially, a very esthetic restoration is created with 3–4 mm of subgingival metal or porcelain. However, this result is not always maintained in the long term.

After the first year of function, there is a mean bone loss of 0.8–1.0 mm. Once the abutment is connected, there can be another 1.1–1.5 mm of bone loss beyond the abutment connection.[1] There may therefore be a 5-mm (or deeper) pocket on the facial aspect and an even greater probing depth interproximally after the first year. As a result, anaerobic bacteria are more likely to develop in the sulcus. Regular oral hygiene is less effective at that depth. If the implant is countersunk below the crestal bone, the weak trabecular bone cannot resist functional loading, leading to faster bone resorption. In the long term, this will result in loss of soft and hard tissue, with a risk of the metal showing around the abutment and a flattening of the interdental papilla.

Loss of tissue around the submerged implant occurs because the biological width is violated. The biological width around a tooth is the combination of the supra-alveolar connective tissue attachment (1.07 mm) and the epithelial attachment (0.97 mm) with an additional sulcus depth of 1.0 mm.[2] It is generally agreed that for an implant, there is no direct attachment between the connective tissue and the titanium. However, there is a tight band of connective tissue around the implant that is considered important in preventing apical migration of the junctional epithelium. Biological width is nature's way of protecting the zone of osseointegration from bacteria and mechanical challenges to the oral cavity.

Experimental data have shown that a biological width does exist around implants. It is a stable structure, even after 15 months of loading (biological width of 2.94–3.08 mm), similar to natural teeth.[3] In a canine model, when the

Figure 1: *The left central incisor has a root fracture and requires extraction and immediate implant placement.*

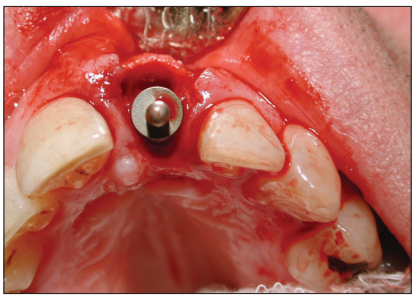

Figure 2: *The tooth is extracted, leaving a large extraction socket and buccal bony contour. A pilot drill is used for correct angulation and depth.*

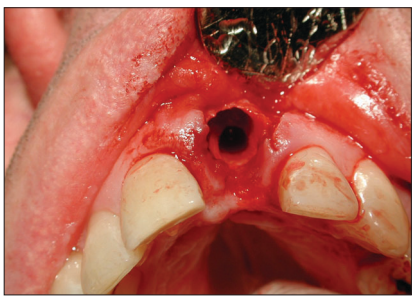

Figure 3: *The osteotomy is completed. To achieve the correct angulations for an immediate implant, the osteotomy must be directed palatally and should not follow exactly the extraction socket, otherwise the restoration will be too far buccally.*

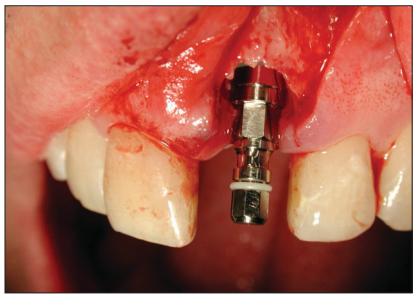

Figure 4: *A nonsubmerged, immediate implant is used (Straumann TE, Waldenburg, Switzerland). The metal collar is above the bone and the abutment connection will be well above the alveolar crest. The implant is not sunk deep to hide the metal collar.*

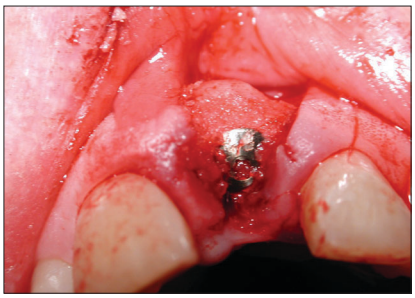

Figure 5: *Rather than sinking the implant deeper to hide the metal collar, the area is grafted with autogenous bone.*

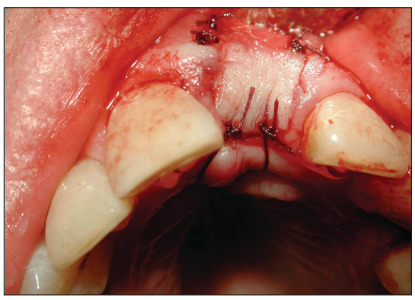

Figure 6: *The soft tissue is augmented with a pedicled buccal flap, rolling the tissue on itself ("buccal roll") to increase the zone of keratinized tissue and to provide thick attached mucosa that will create an ideal scalloped gingival contour in the second-stage surgery.*

zone of connective tissue was removed — resulting in a biological width of only 2 mm after 6 months— bone resorption took place, with biological width reestablished to 3 mm at the expense of the bone around the implant.[4]

Understanding biological width will result in a more predictable long-term esthetic implant. Although a deeper implant is easier to restore with respect to its emergence profile, there is a price to pay later on. Hard and soft tissues will migrate apically. Therefore, in a zone of minimum soft tissue, rather than sink the implant deeper and risk further tissue loss, the soft tissue should be augmented while maintaining the implant head above the bone (0.5 mm above the alveolar crest).[5] Nonsubmerged implants have been shown to comply with the concept of biological width. Weber and others have demonstrated that the epithelial attachment is always more apical and located below the microgap in submerged implants, compared to nonsubmerged implants.[6] To obtain predictable, long-term esthetic soft-tissue outcomes, one may consider soft-tissue augmentation and nonsubmerged implants (**Figs. 1** to **6**). In cases where the tissue in the anterior zone is thin, don't fall into the trap and decide to deeply submerge the implant, instead of choosing to augment the soft tissue, thinking there will be less chance of metal showing. Once the tissue settles, you will be left with a longer clinical crown and poor esthetics. ➧

Dr. Hassan Moghadam *maintains a private practice in Ottawa, Ontario. He is a member of Health Canada's Cells, Tissues, Organs and Assisted Reproduction Surveillance Group. He has no declared financial interests in any company manufacturing the products mentioned in this article. E-mail: hmoghadam@rogers.com.*

Dr. Moghadam's presentation "Soft Tissue Management Around Dental Implants" is part of a session offered by the Ontario Society of Oral and Maxillofacial Surgeons titled Refinements in Implant Dentistry. *The session will be offered on Thursday, May 6.*

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Continuing Dental Education

CDA maintains a current listing of continuing dental education courses to help dentists stay informed about various learning opportunities offered to them in Canada and abroad. For more information about continuing education events listed on the calendar, please contact the organization hosting the event. To view the complete calendar of CDA events, visit CDA's Web site at www.cda-adc.ca.

Canada

April 27 to May 1, 2004

20th Annual American Academy of Cosmetic Dentistry Scientific Session
Vancouver, British Columbia
Web site: www.aacdvancouver.com

May 4–5, 2004

Symposium of the Orofacial Pain Special Interest Group of the International Association of the Study of Pain "Nerve Damage and Neuropathic Trigeminal Pain"
Vancouver, British Columbia
Tel.: (514) 343-6111 #1-3086
E-mail: francine.belanger@umontreal.ca
Web site: www.fdc-umontreal.ca/sig

May 6–8, 2004

ODA Annual Spring Meeting
Toronto, Ontario
Web site: www.oda.on.ca/

May 29 to June 2, 2004

Les journées dentaires internationales du Québec
Montreal, Quebec
Tel.: 1-800-361-4887 or (514) 875-8511
E-mail: congres@odq.qc.ca
Web site:
www.odq.qc.ca/fr/journees/index.html

June 22–26, 2004

3rd Biennial World Congress, International Cleft Lip and Palate Foundation – The Patient Comes First: Defining Directions
Halifax, Nova Scotia
Tel.: (902) 860-3372
Fax: (902) 484-6926
E-mail: arevents@ns.sympatico.ca
Web site: www.cleft2004.org

August 24-27, 2004

17th Congress of the International Association for Disability and Oral Health & 16th Annual International Conference on Special Care Issues in Dentistry
Banff and Calgary, Alberta
Tel.: (519) 679-9860
E-mail: mastroh@ucalgary.ca
Web site: www.iadh.org/congress.htm or www.SCDonline.org

September 9–11, 2004

Canadian Association of Orthodontists – 56th Annual Scientific Meeting
Whistler, British Columbia
Tel.: 1-877-266-8800 or (416) 491-3186
Fax: (416) 491-1670
E-mail: cao@taylorenterprises.com
Web site: www.cao-aco.org

September 16–18, 2004

Saskatchewan Dental Professions – 2004 Annual Scientific Session
Regina, Saskatchewan
E-mail: cdss@dentalcollege.sk.ca
Web site: www.cdssk.ca/news.php

October 10, 2004

Toronto Academy of Dentistry's Annual Winter Clinic
Toronto, Ontario
Tel.: (416) 967-5649
E-mail: admin@tordent.com
Web site: www.tordent.com

USA

April 24–26, 2004

Minnesota Dental Association Star of the North Meeting
St. Paul, Minnesota
Tel.: (651) 646-7454
Web site: http://star.mndental.org

May 27–31, 2004

American Academy of Pediatric Dentistry 57th Annual Session
San Francisco, California
Tel.: (312) 337-2169
Web site: www.aapd.org/annual

June 9–11, 2004

New Jersey Dental Association Annual Convention
Atlantic City, New Jersey
Tel.: (732) 821-9400
Web site: www.njda.org

July 8–11, 2004

Academy of General Dentistry 52nd Annual Meeting
Anaheim, California
Tel.: 1-888-246-3368, ext. 4339
E-mail: agdmeet@agd.org
Web site: www.agd.org/annual.meeting/anaheim/index.html

November 26 to December 1, 2004

80th Annual Greater New York Dental Meeting
New York City, New York
Tel.: (292) 398-6922
Fax: (292)398-6934
E-mail: GNYDM@aol.com
Web site: www.GNYDM.com

International

May 20–22, 2004

Turkish Dental Association 11th International Dental Congress and Expodental 2004
Istanbul, Turkey
E-mail: bilgi@istanbul2004.com
Web site:
www.istanbul2004.com/english.asp

May 28 to June 1, 2004

26th Asia Pacific Dental Congress
Aberdeen, Hong Kong
Tel.: (852) 2871 8787
E-mail: confdept@kham.org.hk
Web site: www.hkda.org

June 10–12, 2004

International Congress of Maxillofacial and Oral Rehabilitation
Kaunas, Lithuania
Tel.: +370 699 56540
E-mail: lss@kaunas.omnitel.net
Web site: www.stomatologija.lt/balticcompass/

August 25–28, 2004

22nd Biennial Conference – New Zealand Dental Association
Christchurch, New Zealand
Tel.: +64 3 379 0390
E-mail: megan@conference.co.nz
Web site: www.nzda.org.nz

September 3–6, 2004

Fourth Trans-Pacific Dental Conference
Canadian Academy of Endodontics
Port Douglas, Australia
E-mail: waynepulver@rogers.com
Web site:
www.caendo.ca/upcoming/transpac/transpac.htm

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Clinical Showcase

Clinical Showcase is a series of pictorial essays that focus on the technical art of clinical dentistry. This section features step-by-step case demonstrations of clinical problems encountered in dental practice. This month's article is by Dr. John Kanca, one of the featured speakers at the Ontario Dental Association Annual Spring Meeting, which will take place in Toronto, Ontario, from May 6 to 8. For more information on the meeting, visit www.oda.on.ca. If you would like to propose a case or recommend a clinician who could contribute to Clinical Showcase, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.

Posterior Composites: Beauty, Efficiency and No Sensitivity

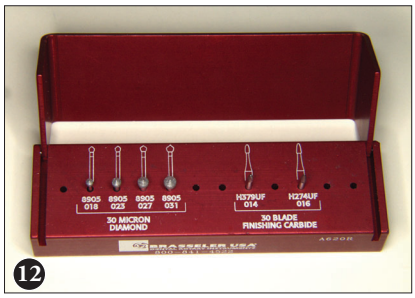
John Kanca III, DMD

Tooth-coloured restorations are a highly desirable health service, especially when they can be delivered in a predictable and sensitivity-free manner. As is typical of restorative dental procedures, there is more than one way to place a posterior resin composite. This article describes a method used by the author to routinely place resin composite restorations in posterior teeth.

Posterior resin composite restorations are becoming increasingly popular. The key to success is the proper technique and selection of materials. A common error in the placement of these restorations is lack of familiarity with a new material, be it an adhesive or a resin composite. Before a new material is used or a new technique implemented, the instructions should be thoroughly reviewed and all parts of the system laid out, such that there will be no need to search for anything, once the technique has begun.

The teeth being restored are the maxillary second bicuspid and the maxillary first molar (**Fig. 1**). The resin adhesive used is Simplicity (Apex Dental Products, Sandwich, Ill.; **Fig. 2**), the flowable composite Permaflo (Ultradent Products, South Jordan, Utah) and the resin composite Vit-l-escence (Ultradent). The first step is to isolate with a rubber dam. The first molar was restored separately from the second bicuspid. It is this author's experience that doing back-to-back resin composite restorations is very difficult and makes problematic a predictable placement of the contact area. Removing the amalgam and beveling all margins completes the preparation (**Fig. 3**).

Two sectional matrices (Garrison Dental, Spring Lake, Mich.) are placed, along with 2 wedges (Flexiwedge, Common Sense Dental, Nunica, Mich.) (**Fig. 4**). Sectional matrices are highly recommended, as they encourage the proper placement of the contact area and permit a desirable contour interproximally. The use of Toffelmire-type retainers tends to result in flat interproximals with contacts at the marginal ridge areas. The next step is to apply the self-etching



adhesive Simplicity and the flowable composite Permaflo. Simplicity is reported to have good bond strengths to enamel and dentin, and to be stable in storage.[1–3] A thin layer (approximately 0.5 mm) of Permaflo is applied to the bottom of the cavity, up to and including the cavosurface interface where the matrix meets the floor of the cavity preparation (**Fig. 5**). This is one of the most important places to apply the flowable composite. Flowable resin composites improve adaptation of the composite to the preparation and, in some cases, improve resistance to dye penetration.[4–8] The flowable composite and the adhesive are light-activated for 10 seconds, using an Ultralume 5 LED light (Ultradent) (**Fig. 6**). If the light output is unknown, then a 20-second exposure is recommended.

If establishment of the contact is going to be obviously difficult, then a slightly modified technique is recommended. To assist in establishing a contact, apply the flowable composite only to one of the proximal boxes and insert a ball burnisher into the cavity. Press the ball burnisher into the desired contact area and hold with a small amount of pressure for 5 seconds. Then, while maintaining that pressure, turn on the activation light for 10 seconds. The flowable resin composite will then hold the newly created contact. This can be repeated for the second contact, if there is one.

Vit-l-escence resin composite shade Pearl Neutral is placed in the proximal boxes to create the interproximal contours (**Fig. 7**). The increments are light-activated for 10 seconds. Placing the resin composite in increments helps create the multichromatic effects seen in natural teeth. The internal aspect is then filled to within 1 mm of the occlusal surface with Vit-l-escence dentin shade A4 and light-activated for 10 seconds (**Fig. 8**). Finally, the missing occlusal portion is added in a manner that minimizes excess (**Fig. 9**). Since enamel is a highly brittle substrate, this layer will be hardened with pulse activation, which is effective in reducing stress along the enamel cavosurface margins.[9–12] It is intended for use on the enamel replacement layer only, as enamel has a much higher modulus of elasticity than dentin and is far more brittle. It is not necessary for the deeper layers of posterior resin composite restorations, where the predominant substrate is dentin. The Ultralume 5 has settings that allow for the control of time of exposure, making it particularly useful for pulse activation and for tacking veneers into place. The Ultralume 5 is set to turn on for 3 seconds, held over the enamel layer of composite and turned on.

The resin composite is allowed to set undisturbed for 10 seconds, at which time the wedges and matrices are removed (**Fig. 10**). Any excess flash at the embrasure areas is removed with a disc and slow-speed handpiece (**Fig. 11**). About 3 minutes into the finishing procedure, the restoration is pulse-activated again for 3 seconds. Preliminary anatomy may be carved into the restoration at this time. Of significant usefulness are the 8905 series of Brasseler multifluted carbide-shaped burs (Brasseler USA, Savannah, Ga.) (**Fig. 12**). The 019 and the 023 sizes are designed for bicuspids; the larger 027 and 031 sizes are designed for molars. The 8905-023 bur was used to carve preliminary anatomy into the restoration (**Figs. 13** and **14**). The rubber dam is then removed and the occlusion further developed (**Fig. 15**).

The restoration is then smoothed with the 379 and 274 burs (**Fig. 16**). A brilliant luster may be created on the surface of the restoration with Jiffy brushes (Ultradent)

(**Fig. 17**). Jiffy brushes are used in the slow-speed handpiece at high rpm on a dry tooth surface, beginning with a gentle application and gradually increasing pressure. The restoration is then sealed to ensure tiny marginal defects are occluded. The Simplicity adhesive is reapplied, followed by a layer of the surface sealer Permaseal (Ultradent), a very thin resin sealer. Permaseal is thinned with air, so no additional occlusal adjustment is necessary. The restoration is then light-activated for 10 seconds per surface, both to activate the sealer and to provide additional energies to the resin composite within the restoration. Because of the use of more than one shade of resin composite, the completed restoration (**Fig. 18**) has taken on a very natural multichromatic effect. The ability to provide natural-appearing, durable and sensitivity-free restorations in a predictable and efficient manner is a great benefit to both patient and practitioner. ◆

***Dr. Kanca** is the creator of the Simplicity adhesive bonding system and has a financial interest in the product. Dr. Kanca maintains a private practice in Middlebury, Conn., with an emphasis on cosmetic dentistry.*

***Correspondence to:** Dr. John Kanca, 390 Middlebury Road, Middlebury, Connecticut USA 06762. E-mail: Wetbonder@aol.com.*

Dr. Kanca's session "Adhesive Dentistry for the New Millennium" will be presented on Saturday, May 8.

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CDSPI Reports

TAKE A COMPLETE LOOK AT YOUR PRACTICE INSURANCE NEEDS

By Renata Whiteman

If you're like many dentists, insurance considerations for your dental practice go far beyond protection against threats like theft, fire and floods. For example, would you have the right insurance in place to help offset the financial loss if an important piece of equipment in your practice accidentally broke down? How would you contend with the overhead costs of your practice while temporarily disabled? Are there good reasons to obtain office contents and building coverage from the same provider? Would you be prepared to deal with the financial consequences if your partner died?

Consider the following suggestions to ensure the financial health of your dental practice is fully protected.

Office Insurance

The Canadian Dentists' Insurance Program's office insurance plan — TripleGuard™ Insurance — is a convenient and economical way to protect your dental practice against 3 financial threats. The plan helps you contend with the cost of replacing your office equipment and supplies when disaster strikes, lost income and expenses due to a covered business interruption (such as a flood), and the cost of third-party legal actions (such as a slip-and-fall lawsuit).

Even if you have TripleGuard™ Insurance (like thousands of your colleagues), your coverage amount may be insufficient if you recently added or upgraded equipment or furnishing at your practice. If you have existing coverage, call the number below to ensure your coverage reflects your present needs.

Although the TripleGuard™ Insurance plan provides other valuable protections at no additional cost — such as employee dishonesty and earthquake coverages — you can customize the plan to suit your needs with your choice of 2 options: Equipment Breakdown and Building Insurance coverage.

The Equipment Breakdown Option

Smoothly working equipment in your dental practice is vital to your business. But if an important piece of equipment accidentally broke down, you could face serious financial headaches. Even if that equipment is under warranty, you could lose income while the device is inoperable.

Fortunately, the TripleGuard™ Insurance plan's Equipment Breakdown Option provides you with 2 kinds of financial protection should certain types of equipment in your office accidentally break down due to an insured peril (such as a power surge). It pays for the repair or replacement of broken equipment (subject to a $500 deductible) and reimburses you if the breakdown results in a loss of income.

It's important to recognize that you must purchase this option to have equipment breakdown coverage — it is not automatically included in the TripleGuard™ Insurance plan.

Building Insurance

At the request of dentists who own the buildings in which they practise, the Insurance Program will offer building insurance later this spring — an option which will be available for an additional premium under the TripleGuard™ Insurance plan.

While the core TripleGuard™ Insurance plan protects your office contents (such as your dental equipment, furniture and furnishings), the Building Insurance Option will provide added protection by covering your building's structure — such as the walls and roofing.

There are 2 major advantages of obtaining contents and structure coverage from a single source. The first is one-stop convenience. Second, you can avoid potential headaches in the event you need to file a claim following a disaster — by not having to deal with 2 separate insurance companies. The cost of the Building Insurance Option will vary depending on the type of structure to be insured.

Office Overhead Expense Insurance

If you were to become disabled, your disability insurance benefits would help replace your *personal* income. So how would you contend with the substantial monthly expenses of your practice — such as rent, employee salaries and utilities? If you own a practice, or are an associate or a partner, you should strongly consider obtaining Office Overhead Expense Insurance. The Program's plan provides a monthly benefit to help you continue to meet these commitments when you are disabled, since your practice's income will likely be reduced or halted by your inability to work. (If you're a partner or an associate or are in a cost-sharing arrangement, you may be responsible for a share of the overhead and therefore still need to consider obtaining office overhead expense insurance.)

continued on page 201

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For further information about this exceptional career opportunity and to apply, please contact: **Dr. Ray McIlwain, Director, United Church Health Services or Ms. Diane Matheson, Dental Clinic Manager, Bag 999, Hazelton, British Columbia, V0J 1Y0. Phone: 1-800-639-0888, (250) 799-5240 or (250) 842-5373. Fax: (250) 842-5613.** D1402

Selling a practice?
Leasing an office?
Buying equipment?
Renting your vacation property?

To place your CDA Classified ad contact:

Beverley Kirkpatrick or Deborah Rodd
Toll-free at
(800) 663-7336 ext. 2127/2314
Fax (613) 565-7488
E-mail advertising@cma.ca

Advertisements are also published online (www.cda-adc.ca/jcda) at no additional charge.

purchase other half. Call Taiss at (604) 937-3636 or e-mail rkanders@portal.ca with subject header Partnership. D1472

BRITISH COLUMBIA - Kamloops: We need a talented, personable associate dentist. Join our wonderful office with great atmosphere and staff that are as committed as you to exceptional dental health. Long-term commitment and buy-in for right person. Contact Dr. D.B. Dextraze by tel. (250) 376-5354 or fax (250) 376-5367. D1474

BRITISH COLUMBIA: Full-time associate wanted Monday-Friday. Busy practice, established patient load. New equipment - 7 operatories. Pleasant working environment. Practice located in Pitt Meadows (metropolitan Vancouver). Please call (604) 465-7733. D1482

BRITISH COLUMBIA - Vancouver Island (Nanaimo): Join me in my newly renovated, 6-operatory, amalgam-free solo practice. Full-time associate position leading to partnership; 15-year, beautiful downtown location, lucrative, busy practice. Presently seeing 30 to 40 new patients per month. Only those dedicated to providing quality care, willing to work hard and have fun doing so need apply. Check us out at our Web site www.toothwisdom.com. Dr. Larry Hill, tel. (250) 754-4322 (bus.), (250) 729-7151 (res.). D1484

BRITISH COLUMBIA - Sidney: Join Dr. Harold Prussin (McGill '71) and his enthusiastic staff in the picturesque seaside town of Sidney, B.C., in Canada's best climate. Comprehensive, non-insurance dentistry with selected clientele. Low disease, elective dental practice, serious future focus required. E-mail haroldprussin@msn.com. D1463

BRITISH COLUMBIA - Victoria: Associate opportunity. Busy, progressive family practice requires a motivated, enthusiastic dentist to take over existing patients and work with 2 other dentists in providing total patient care. Newly renovated, well-equipped, 5-operatory office located in Victoria Eaton Centre. Optional future buy-in potential. For further information please contact: Dr. Don Bays, tel. (250) 381-6433 (bus.), (250) 595-8050 (res.), fax (250) 381-6421, e-mail nbays@shaw.ca. D1417

IWK Health Centre

The IWK Health Centre, Halifax, Nova Scotia, is located on one of the world's great natural harbours and is home to many fine restaurants, a bustling waterfront and an active theatrical community. The IWK Health Centre provides quality care for children, women and families in the three Maritime provinces and beyond. It is a tertiary care health centre dedicated to family-centred care, education and research.

PAEDIATRIC DENTIST

The Department of Dentistry at the IWK Health Centre is actively seeking a Paediatric Dentist. The IWK Health Centre is associated with Dalhousie University Faculties of Dentistry, Medicine and Allied Health Sciences. Paediatric Dentists must be eligible for licensure with the Provincial Dental Board of Nova Scotia.

The Paediatric Dentist should have training and demonstrated competence in provision of multidisciplinary care to tertiary care paediatric hospital patients including medically compromised and severely mentally or physically disabled patients, both in the clinic and the operating room. In addition to the clinical activities described, the successful candidate will provide care to secondary care paediatric dental patients referred to the Paediatric Dental Unit in the Children's Health Program at the Health Centre from communities within the province of Nova Scotia.

Active staff Paediatric Dentists are involved in the teaching of undergraduate dental students on an assigned basis through the Faculty of Dentistry, Dalhousie University. Paediatric Dentists also participate in teaching of undergraduate and graduate medical students at the Health Centre.

In accordance with Canadian immigration regulations, priority will be given to Canadian citizens and permanent residents of Canada. Please send a cover letter and curriculum vitae along with two letters of reference to:

Dr. Ross D. Anderson, Chief of Dentistry
C/O Human Resources, IWK Health Centre
5850/5980 University Avenue, PO Box 3070, Halifax NS B3J 3G9
Tel. (902) 470-8678, (902) 470-6430, Fax (902) 470-6612
E-mail ross.anderson@iwk.nshealth.ca
Web site www.iwk.nshealth.ca

Helping Children, Youth and Women in the Maritimes be the Healthiest in the World.
The IWK Health Centre and Dalhousie University are equal opportunity employers and educators.

D1477

GRADUATE/POSTGRADUATE STUDIES
THE UNIVERSITY OF BRITISH COLUMBIA
FACULTY OF DENTISTRY

2199 Wesbrook Mall, Vancouver, B.C., Canada V6T 1Z3

Applications are invited for admission to the following graduate and postgraduate programmes:

M.Sc. and Ph.D. in DENTAL SCIENCE

These graduate programmes are research-oriented, and do not include clinical training. The M.Sc. degree normally requires 2 years full-time study, and can also be taken part time. The Ph.D. degree requires a minimum of 3 years for completion. Both offer research training in various oral and dental sciences.

COMBINED M.Sc (DENTAL SCIENCE) and DIPLOMA PROGRAMME IN PERIODONTICS

This programme offers an M.Sc. degree and postgraduate clinical specialist training in Periodontics. The 3-year programme is certified and fully accredited by the Canadian Dental Association. It is also recognized by the American Dental Association.

ORAL MEDICINE AND ORAL PATHOLOGY POSTGRADUATE PROGRAMME

This postgraduate residency training in Oral Medicine and Oral Pathology is offered in conjunction with University-affiliated teaching hospitals. It consists of a 3 or 4-year hospital-based, stipended residency in one of three pathways: Oral Medicine, Oral Pathology, or both specialties combined.

For more information regarding application to the above programmes contact: Mrs. Viki Koulouris, e-mail vickybk@interchange.ubc.ca Tel. (604) 822-4486/ Fax (604) 822-3562.

GENERAL PRACTICE RESIDENCY PROGRAMME

This 1-year dental residency programme is offered in conjunction with University-affiliated teaching hospitals. It has a vacancy in Pediatric Dentistry beginning July 1 or June 15.

For more information regarding application for this position contact: Ms. Dorothy Standfield, e-mail dstanf@unixg.ubc.ca Tel (604) 822-0345/Fax (604) 822-3562.

D1100

Classified Ads

NEWFOUNDLAND - Bay Roberts: Forty-five minutes from Saint John's. Full-time dental associate required June 2004 for a large, well-established, busy practice. This is an excellent opportunity for a hard-working, motivated individual interested in all aspects of dentistry. Very little specialty support, so a full range of dentistry is supplied to our patients. Excellent income potential. Current associate leaving the province. Further information will be supplied to interested individuals. If interested, please mail or fax resume, or letter of interest to: Dr. Michelle Zwicker, PO Box 1560, Bay Roberts, NL A0A 1G0, fax (709) 786-0895 or e-mail a letter of interest to mdzwicker@nf.sympatico.ca. D1450

NORTHWEST TERRITORIES - Yellowknife: Extremely busy Yellowknife dental practice needs a highly motivated associate dentist. The right person will be quality orientated, and can expect to be busy from day one. A high income is assured, as is an enviable lifestyle. For further information, please telephone Dr. Roger Armstrong at (867) 766-2060, and fax resumes to (867) 873-5032. D1410

NORTHWEST TERRITORIES - Yellowknife: Associate needed to join an established, very busy, modern dental clinic (6 dentists) in a thriving community - the diamond capital of North America. The clinic offers all modern equipment including intraoral cameras, abrasion units, etc., with an excellent and friendly support staff, providing very high-quality dentistry, with the emphasis on quality rather than quantity. This is an excellent opportunity for anyone wishing to enjoy a wonderful lifestyle whilst practising dentistry at its best. Please send resume to: Administration, PO Box 1118, Yellowknife, NT X1A 2N8; tel. (867) 873-6940, fax (867) 873-6941. D1159

NORTHWEST TERRITORIES - Fort Smith: Associate dentist for Fort Smith Dental Clinic. Utilize the full range of your skills working in our modern, well-equipped clinic with skilled and experienced staff. The centre for Wood Buffalo National Park and located beside world-class whitewater of the Slave River rapids, Fort Smith is an ideal location if you love the outdoors. This is a full-time position offering an established patient base and an excellent compensation package. Opportunity for future partnership and/or succession. Tel. (867) 872-2044, fax (867) 872-5813, e-mail whill@auroranet.nt.ca or send resume to: Dr. Hill, Fort Smith Dental Clinic, PO Box 1047, Fort Smith, NT X0E 0P0. D1191

NORTHWEST TERRITORIES - Yellowknife: Seeking experienced orthodontic lab technician to live and work in the city of Yellowknife, Northwest Territories. Attractive salary and compensation package. Please send application including CV and salary expectations, to: CDA Classified Box # 2828. D1216

NOVA SCOTIA - Yarmouth: Associate/registered dental hygienist positions. Locum required for 3 months commencing in May/June 2004. Position has potential to develop into permanent associateship with performance incentives and future buy-in potential. Full-time registered dental hygienist position available. We are a busy, family-oriented practice with excellent support staff. We are relocating to a new, 8-operatory clinic in a heritage home in downtown Yarmouth. Please forward resume to: Dr. Michel Comeau, Southwest Dental Surgeons Limited, 101A-101 Water St., Yarmouth, NS B5A 4P4; fax (902) 742-0179, e-mail macdent@klis.com. D1476

NOVA SCOTIA - Bridgewater: Locum dentist required for maternity leave starting June 30, 2004. Office located in beautiful Bridgewater, Nova Scotia. Very busy practice. If interested please fax resume to (902) 543-5101. D1462

NOVA SCOTIA - Chester: Associateship leading to purchase. Busy 6-operatory practice, all aspects of dentistry performed. Live and work in Chester "The Sailing Capital of Nova Scotia". Chester Family Dental Centre Ltd., PO Box 718, Chester, NS B0J 1J0; tel. (902) 275-5184. D1466

NUNAVUT - Iqaluit: Dentists wanted! Busy Nunavut dental clinic requires full-time associate in Iqaluit. Community of 7,000 +, only serviced by one other clinic. Part-time locum positions also available in other communities. Excellent remuneration. All travel and accommodations paid for. Fax CV to (867) 979-6744 or e-mail coreygrossman @yahoo.ca. D1373

ONTARIO - Ottawa: Orthodontist required 1 day/week for busy east-end family practice. Please fax resume to (613) 834-9953 or call Tess at (613) 834-6336. D1471

ONTARIO - South Central: Associate position available. Join our growing and dynamic practice of experienced and dedicated health care professionals. Please e-mail mkosidoy0991@rogers.com, tel. (705) 435-5102, fax (705) 435-3025. D1475

ONTARIO - Northern: Position available for a full-time associate with partnership opportunity for the right applicant. The candidate must demonstrate leadership ability, strong initiative and high energy; be a team player and value/respect the contributions of all team members; possess exceptional communication and collaboration skills; be committed to ongoing professional development; model a strong work ethic, effective time management and comprehensive planning abilities. Fluent in English (French would be an asset). The successful applicant possessing these skills will be rewarded with excellent remuneration, high production, high collection and a low downtime work environment. This is an excellent opportunity for anyone wishing to enjoy a wonderful lifestyle while practising dentistry at its best! Interested candidates please fax resume to (705) 335-6556 or e-mail natgrant@ntl.sympatico.ca. D1479

ONTARIO - Ottawa East: Associate opportunity. Busy, progressive family practice requires a motivated, enthusiastic bilingual (English/French) dentist to work with 2 other dentists in providing total patient care. Newly renovated, well-equipped, 5-operatory office. Located 20 minutes east of Canada's capital, Ottawa. Optional future buy-in potential. For further information, please contact: Julie, 2911 Laurier St., PO Box 999, Rockland, ON K4K 1L6; tel. (613) 446-3368, fax (613) 446-5006. D1483

ONTARIO - Brockville: Experienced associate required for 1 of 2 well-established, busy practices. Enjoy a small-town atmosphere and the scenic beauty of the 1000 Islands region with easy access to large city centres. Only 30 minutes to Kingston and 60 minutes to Ottawa. For more information contact:

Dr. George Christodoulou, Altima Dental Canada, tel. (416) 785-1828, ext. 201, e-mail drgeorge@altima.ca. D1269

QUEBEC - Outaouais/Gatineau: Associate wanted full time for multidisciplinary group practice in new professional centre with 7 operatories, overlooking the waterfalls of the Gatineau River; 125 new patients monthly, low percentage of RAMQ. Fully booked on the first day. Ask for Louise, tel. (819) 246-0246, e-mail centredentairelimbour@videotron.ca. D1486

QUEBEC - Eastern Townships: Windsor, near Sherbrooke. We are giving an associate the opportunity to become part of a mature and fully competent team. Pleasant and motivating work atmosphere. Please fax resume to (819) 845-7854. Tel. Dr. Jacques Vaillancourt, (819) 845-3080. D1371

SASKATCHEWAN - Regina: Associate opportunity. Our well-established practice has an opening. Our practice is located in a culturally diverse community and attracts a continuous stream of new patients (over 50/week). A computerized online database and solid practice management result in excellent collections and control of accounts receivable. This opportunity guarantees the right applicant an immediate income stream over $200,000. Buy-in option available. Contact: Mary Jane Katz, Office Manager, Cathedral Dental Centre, 3032 13th Ave., Regina, SK S4T 1N9; tel. (306) 584-0650 (after 6 p.m.), fax (306) 585-3512, e-mail mkatz@accesscomm.ca. D1485

YUKON TERRITORY - Whitehorse: Come for the beauty - mountains, lakes and rivers. Or come for the opportunity to practise dentistry where you are appreciated and well compensated. Have a look at our Web site www.klondike-dental.com. Tel. (867) 668-4618, fax (867) 667-4944. D1422

Equipment Sales & Service

WANTED: Surgical operating microscope. Prefer Zeiss or Global. Please fax information to (403) 225-2557. D1456

CDSPI Reports
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Partner Insurance

If you practise with a partner, or have a cost-sharing arrangement with a dentist at your office, you may wish to protect your stake in the practice through the use of life insurance.

With Partner Insurance from the Canadian Dentists' Insurance Program, you can gain the financial resources you need to offset financial losses on the death of a key person in your practice, or to buy out a deceased partner's interest in the practice (fund a buy/sell agreement). The Insurance Program offers 2 types of Partner Insurance — term and permanent life insurance. Term insurance may be appropriate for your needs if you plan to dissolve the practice by age 65. Permanent insurance may be appropriate if you plan to continue the practice beyond that age.

Renata Whiteman is a licensed insurance agent for Professional Guide Line Inc. — A CDSPI Affiliate. For a complete picture of your office insurance needs, you can speak at no cost to a licensed, non-commissioned insurance professional at Professional Guide Line by dialing 1-877-293-9455 or 416-296-9455, extension 5002.*

The Canadian Dentists' Insurance Program's TripleGuard™ Insurance plan is underwritten by Aviva Insurance Company of Canada. The Program's Office Overhead Expense and Partner Insurance plans are underwritten by The Manufacturers Life Insurance Company (Manulife Financial). Contact Professional Guide Line Inc. or CDSPI for insurance contract details.

**Restrictions may apply to advisory services in certain jurisdictions. Residents of Quebec and PEI, please call CDSPI at 1-800-561-9401, extension 5000, for insurance plan information.*

CDSPI *Information provided by Canadian Dental Service Plans Inc.*

CDA Funds

CHECK OUT OUR PERFORMANCE

✔ Superior Long-Term Returns
✔ Leading Fund Managers
✔ Low Fees

CDA Funds can be used in your CDA RSP, CDA RIF, CDA Seg Fund Investment Account and CDA RESP.

CDA Fund Performance (for period ending January 31, 2004)

	MER	1 year	3 years	5 years	10 years
CDA CANADIAN GROWTH FUNDS					
Aggressive Equity fund (Altamira)	up to 1.00%	51.4%	12.7%	12.2%	n/a
Common Stock fund (Altamira)	up to 0.99%	29.1%	-3.1%	6.5%	6.2%
Canadian Equity fund (Trimark)†[1]	up to 1.65%	23.3%	3.3%	9.3%	7.9%
Special Equity fund (KBSH)†[2]	up to 1.45%	33.1%	-10.5%	5.0%	13.7%
TSX Composite Index fund (BGI)	up to 0.67%	31.1%	-1.9%	5.9%	7.7%
CDA INTERNATIONAL GROWTH FUNDS					
Emerging Markets fund (KBSH)	up to 1.45%	47.4%	4.6%	15.8%	n/a
European fund (KBSH)	up to 1.45%	18.1%	-17.3%	-6.4%	n/a
International Equity fund (KBSH)	up to 1.45%	25.6%	-13.6%	-1.0%	n/a
Pacific Basin fund (KBSH)	up to 1.45%	25.7%	-18.0%	-2.8%	n/a
US Equity fund (KBSH)†[3]	up to 1.20%	7.3%	-14.8%	-2.0%	9.4%
Global fund (Trimark)†[4]	up to 1.65%	19.8%	5.0%	9.2%	10.7%
Global Stock fund (Templeton)†[5]	up to 1.77%	25.1%	-3.1%	1.2%	n/a
S&P 500 Index fund (BGI)††	up to 0.67%	15.0%	-9.1%	-4.2%	10.2%
CDA INCOME FUNDS					
Bond and Mortgage fund (Fiera)	up to 0.99%	8.1%	6.5%	5.4%	6.2%
Fixed Income fund (McLean Budden)†[6]	up to 0.97%	7.5%	6.7%	5.6%	7.0%
CDA CASH AND EQUIVALENT FUND					
Money Market fund (Fiera)	up to 0.67%	2.4%	2.7%	3.5%	4.1%
CDA GROWTH AND INCOME FUNDS					
Balanced fund (KBSH)	up to 1.00%	14.5%	-2.0%	4.3%	6.7%
Balanced Value fund (McLean Budden)†[7]	up to 0.95%	15.7%	4.6%	6.9%	8.3%

CDA figures indicate annual compound rate of return. All fees have been deducted. As a result, performance results may differ from those published by the fund managers. CDA figures are historical rates based on past performance and are not necessarily indicative of future performance. The annual MERs (Management Expense Ratios) depend on the value of the assets in the given funds. MERs shown are maximum.

† *Returns shown are those for the following funds in which CDA funds invest: [1]Trimark Canadian Fund, [2]KBSH Special Equity Fund, [3]KBSH US Equity Fund, [4]Trimark Fund, [5]Templeton Global Stock Trust Fund, [6]McLean Budden Fixed Income Fund, [7]McLean Budden Balanced Value Fund.*

†† *Returns shown are the total returns for the index tracked by this fund.*

For current unit values and GIC rates call CDSPI toll-free at 1-800-561-9401, ext. 5024 or visit the CDSPI Web site at www.cdspi.com.

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