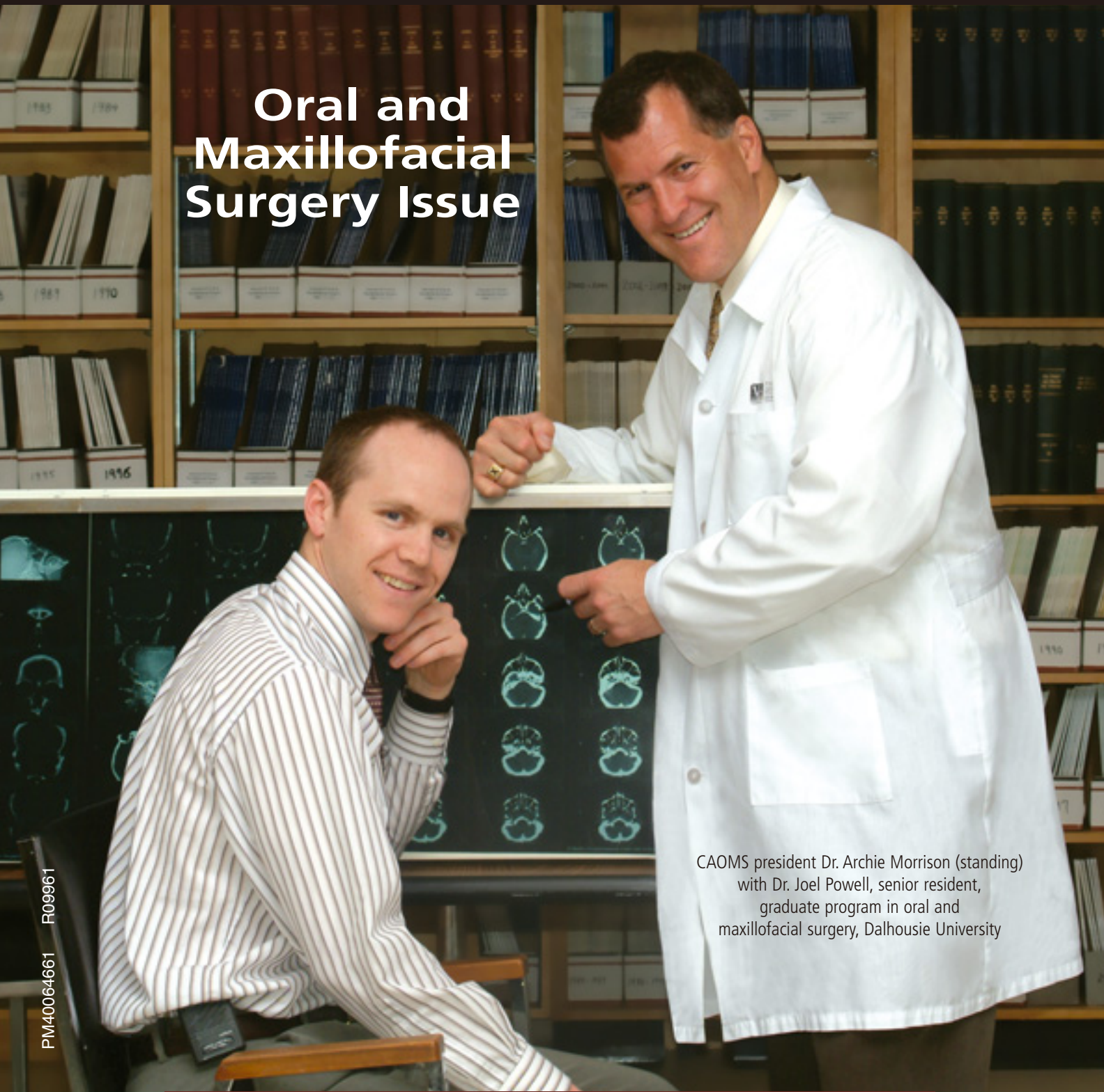


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Oral and Maxillofacial Surgery Issue



CAOMS president Dr. Archie Morrison (standing) with Dr. Joel Powell, senior resident, graduate program in oral and maxillofacial surgery, Dalhousie University

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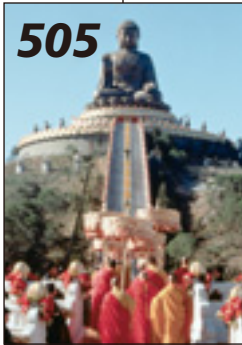
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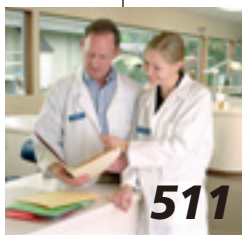
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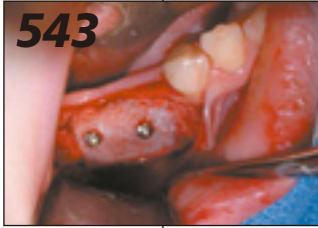
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Dr. John P. O'Keefe

Is Competition Good for Care?

“One goal of working closely with our CAOMS colleagues is to bring you up-to-date information on topics that are of everyday importance to general practitioners.”

This issue of *JCDA* is a special edition published in conjunction with the Canadian Association of Oral and Maxillofacial Surgeons (CAOMS). One goal of working closely with our CAOMS colleagues is to bring you up-to-date information on topics that are of everyday importance to general practitioners, for example post-extraction nerve injuries, surgical emphysema and what to do when your patient is a victim of family violence.

Another goal is to provide updates on clinical topic areas that may appear distant from the day-to-day activities of most general practitioners but which our specialist colleagues handle on a regular basis. In this light, I am thinking of the articles on facial trauma, supraorbital fractures, and fat embolism following iliac crest bone harvesting. These articles not only provide a glimpse into our surgical colleagues' activities, they also highlight the advancing boundaries of our profession's scope of practice.

I am sure that our specialist colleagues can recount stories about contested scope of practice issues with colleagues in other professions.

Such friction surrounding traditional scopes of practice, and the reactions to them, are becoming more commonplace in the modern climate for the health professions. Over the past couple of decades, it seems that we have been moving away from discrete and distinct scopes of practice to a situation where overlapping boundaries are the norm. Government policy makers have encouraged this change in the hope that the evolving regulatory environment would promote competition and innovation in the delivery of health services. Some stated goals of these developments are to increase patient choice, reduce health care costs and ensure adequate quality of care.

Canada's Commissioner of Competition has an interest in these policy goals and is currently

paying attention to our sector. She singled out dental hygiene services for attention in a speech delivered on May 15, 2006, in Toronto. According to the Commissioner, countries like Canada have no choice but to inject competition and innovation into the marketplace, especially in the increasingly important services sector, if we are to thrive in the climate of globalization in the 21st century.

In the speech, the Commissioner states, “To get the most out of our creative people we must ensure that their skills are deployed in marketplaces that are competitive — which are unburdened by ineffective, inefficient and unnecessary regulations which may even impede professionals from making full use of their qualifications.” While acknowledging that people at the Competition Bureau may be pro-competition, the Commissioner denies that they are competition zealots who “argue blindly for competition at the expense of all other goals.”

This is encouraging news indeed, because it leads me to believe that the Bureau should be open to the valid arguments that the dental profession can make in the areas of patient safety, cost-effectiveness, efficiency of oral care delivery, collaborative care, and levels of practitioner competence.

I am concerned that competition authorities around the world are advocating direct access to dental hygiene services seemingly without appropriate consultation with the dental profession. My primary concern stems from the fact that “dental hygiene services” is a term that can be misinterpreted. Furthermore, I am also concerned that dental hygiene groups would like to see hygienists assuming the role of primary oral health care provider, trying to persuade policy makers that oral health care is not a sufficiently demanding science requiring leadership from highly trained and competent dentists for case management.

I have met a number of dentists who had previously been dental hygienists and a common refrain is: “I didn't know what I didn't know when I was a hygienist.” In the headlong rush to modernity through innovation and competition, I ask for further consultation to examine the appropriate level of knowledge required for coordinating the type of oral health care that Canadians deserve.

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Dr. Wayne Halstrom

A Climate of Cooperation and Collaboration

“Associations share one fundamental goal: we are all here to serve our members.”

Words are such playthings! We fashion words around feelings, circumstances and agendas. Last year, Dr. Jack Cottrell fashioned his tenure as CDA president around the word “connected,” as in we are all connected within our profession and must work together to achieve desired outcomes. This year, I am taking his theme one step further and would like to add 2 more “C” words — cooperation and collaboration.

Associations share one fundamental goal: we are all here to serve our members. Whether it is the Prince George Dental Society and Association, the Dental Association of Prince Edward Island or the Canadian Dental Association, we all have a common desire to meet the needs and wants of our members. To maximize the outcomes that we seek on behalf of our members, it is essential that all levels of organized dentistry operate within a framework characterized by cooperation and collaboration. If we fail to keep these 2 ideals in mind, we may find another “C” word creeping in — conflict. There is no room for conflict in our profession.

Another common goal held by associations is to provide benefits for its members. It is simply not enough for collegiality alone to be the primary reason for belonging. Yet in pursuing value for members, we can sometimes stumble across each other. For instance, most associations seek sponsorship for various events and activities. Similarly, as we respond to media requests, there can be differences of opinion as to which jurisdiction should prevail. These are but 2 examples of arenas where there is potential for conflict in the absence of collaboration and cooperation.

Happily I am able to report to you that cooperation and collaboration are alive and well within the dental community in Canada. Inter-jurisdictional issues can be negated by fostering strong working relationships with our colleagues. Along these lines, CDA has established a task

force to examine the current state of relations between CDA and its corporate members. The task force will use a consensus approach to come up with recommendations that allow all associations to achieve member satisfaction.

Collaboration and cooperation also apply beyond our borders. CDA meets with representatives of the American Dental Association throughout the year, which brings our 2 worlds together. Both parties recognize that actions on one side of the border can have an effect on the other. We have a history of engaging with our American colleagues on issues involved with accreditation. This relationship is unique; there is no other nation with which we share such a common bond that allows reciprocal recognition of credentials. This accomplishment was achieved only through collaboration and cooperation.

Our relationships extend beyond the American border. In the past few years CDA has made steps to establish a relationship with the Mexican Dental Association. When one considers that there are some 190,000 dentists in Brazil, the sheer scale of the profession around the world becomes apparent.

The profession's global nature will be reinforced in 2007 when CDA past president Dr. Burton Conrod becomes the first Canadian president of the FDI World Dental Federation. Having attended an FDI General Assembly, I am aware of the significance of this body to Canada. The Assembly functions much like the United Nations, where member countries small and large are able to express their oral health concerns and needs. The Assembly also approves FDI position statements, the effect of which can be felt around the globe. If one nation brings an issue to the fore that is cogent to their own situation but which, if adopted on the world stage, would have serious repercussions in other jurisdictions, we must remain involved and vigilant.

Our membership in FDI and the relationships that we have been able to establish are indicative of the collaboration and cooperation required to maintain a healthy and vibrant profession at home. We should always seek ways to work together for the benefit of our patients and our profession.

Wayne Halstrom, BA, DDS
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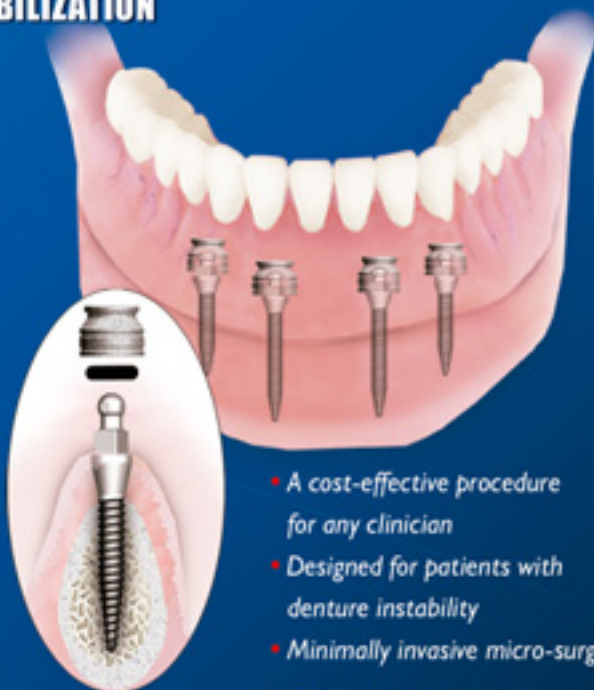
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Avian Influenza Pandemic: Overhype or Real Threat?

Clarification is required regarding the “Point of Care” article on the avian influenza virus published in *JCDA*.¹

By definition, any planning for a future crisis is based on past experiences and assumptions about the nature and extent of the crisis. Theoretical modelling is used for the assumptions associated with a possible avian influenza pandemic. The paucity of information on any new such pandemic means that a wide range of plausible but uncertain assumptions have been made. To what degree these assumptions become factual and validate current planning protocols will be known following world surveillance of emerging trends regarding the human-to-human transmission of H5N1. At present, an avian influenza pandemic does not exist. In fact, plans for this pandemic are concerned with a bird virus that might mutate into a different virus which doesn't as yet exist — but if it did exist, might cause a pandemic of an incurable flu.

An October 19, 2005 publication from the European Centre for Disease Prevention and Control indicates that there is extreme confusion in the minds of the public between avian and pandemic influenza and that “the perception of risk is massive while [...] the actual risk to the individual from avian influenza is incredibly low, even if they are exposed to infected poultry.”² The publication further states that the confusion is “leading to disproportionate anxiety and needs to be addressed urgently otherwise when the pandemic of ‘bird flu’ fails to materialize the case for preparing for the next pandemic will be undermined.”²

It could be argued that the assumptions have been manipulated by the media to generate hyperbole and unnecessary fear. In an effort to quell such panic, Professor Sir David King, the U.K.'s chief scientist, stated in March of this year: “Simply put, this [avian flu pandemic] is not an issue we should worry about in terms of public health.”³

Perhaps readers should consider this reasoned opinion as they develop individual risk management strategies for dealing with a theoretical pandemic. ♦

*Dr. John Hardie
Lisburn, Northern Ireland*

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3. Henderson M. Lottery win more likely than bird flu. *Times Online*, Friday, March 3, 2006.

Response from the Authors

Dr. Hardie suggests that the dental community follow the more reasoned advice of Professor Sir David King, who stated that an avian flu pandemic “is not an issue we should worry about in terms of public health.” I have conferred with the Office of Science and Technology, where Sir David is the chief scientific advisor, to confirm that he was

speaking to the National Farmers Union about the current risk of contracting H5N1 in its current form (without widespread human-to-human transmission) should it become endemic in the poultry population of the United Kingdom. He was by no means suggesting that H5N1 would not convert to a strain with efficient human-to-human transmission nor was he suggesting that the population (especially the health care community) should be complacent in its pre-pandemic preparedness.

We have faced SARS and watched our colleagues fall due to a lack of preparedness. It would be shortsighted not to prepare for a disease that has the potential to spread more quickly and cause greater mortality. The World Health Organization, Health Canada, the U.S. Centers for Disease Control and Prevention, and the U.K. Department of Health (among many others) have all set in place plans to deal with H5N1 should it become pandemic. The simple truth is that pandemic influenza will spread far too quickly not to plan ahead. To suggest that our community should ignore the reality of the situation or fail to plan because of some misguided fear of public panic is not only thoughtless but has the potential to be deadly. ♦

*Dr. Ian Furst
Dr. Martha Fulford
Cambridge, Ontario*

The Puzzling Career Choices of Dentists

After I stepped down as associate dean and chair of the department of dentistry at the University of

Editor's Comment

JCDA welcomes letters from readers about topics that are relevant to the dental profession. The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the Canadian Dental Association. *JCDA* reserves the right to edit letters for length and style. 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.

Alberta in 2003, I joined ROI Corporation, a dental practice appraisal and brokerage firm, the following year. In a very short time, my eyes have been opened wide to the career choices made by many of our younger dentists. Some of them, to be frank, puzzle me immensely!

The most shocking revelation is that opportunities are abundant for dentists in the small towns of Saskatchewan and Alberta (as they are in other provinces), but trying to get the dentists interested in these situations is parallel to “herding frogs.” Lucrative opportunities coupled with a more stress-free lifestyle, low overheads, huge professional rewards and the chance to deliver all phases of dentistry should appeal to the dental student population. Sadly, these advantages don’t appeal to the younger set.

Our major cities are approaching the saturation point for dentist-to-population ratios and competition is fierce in the urban markets. High overheads for space rentals and the diminished opportunity to actually “own” a practice should also point our young dentists to small towns. Imagine paying between \$3,500 and \$5,500 in monthly rents for over 20 years, and still not owning a building or building up any real estate equity. The smaller town dentist may have a practice that is appraised at a lower value than a “big city” practice, but the difference may be readily made up in equity or ownership of a building.

Another shocking discovery is that most dentists do not have any plan for the sale of their practice when faced with an unexpected event like a snowmobile accident or a stroke. I have seen practices sit idle and lose value rapidly while patients seek treatment elsewhere. The estate is literally left ‘holding the liability bag’ while the value of a practice declines daily. Often, nothing is done until it is too late. Dentists need to know about Practice Preservation, a

service offered by ROI Corporation, that doesn’t cost a cent and could literally save them hundreds of thousands of dollars.

If I had one thing to say to my students of the past 20 years, and to the many dentists I have met across Canada, it would be this: Please, for the sake of your family, your children and your grandchildren, plan for the unlikely. Have your practice appraised and set up a plan (a living will) for your practice now! ♦

*Dr. G. Wayne Raborn
Senior associate for ROI Corporation
Alberta region*

Malignant Transformation of Oral Lichen Planus

The most worrisome complication of erosive mucosal lichen planus is the development of squamous cell carcinoma (SCC). We would like to report 2 new cases of this condition. The first is that of a 71-year-old woman with diabetes who presented with extensive ulceration — histologically confirmed erosive oral lichen planus that had been developing for 6 years — on the left side of the tongue, 5 cm in size, with irregular shape, granulated and bleeding (Fig. 1). Results of the histologic study

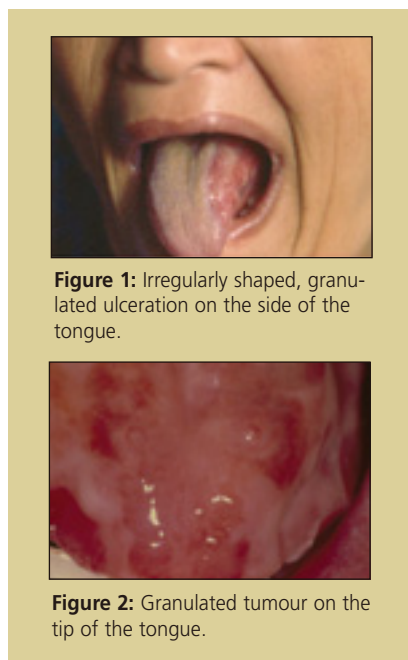


Figure 1: Irregularly shaped, granulated ulceration on the side of the tongue.

Figure 2: Granulated tumour on the tip of the tongue.

showed a microinvasive SCC. The second case is that of a 47-year-old woman with anemia of chronic disease whose histologically confirmed erosive oral lichen planus had evolved, over 7 years, into 2 granulated, infiltrated tumours, one 2 cm in size on the tip of the tongue and the other measuring 1 cm on the lingual frenum (Fig. 2). The results of the biopsy revealed well-differentiated intraepidermal SCC.

Deterioration of oral lichen planus into SCC occurs in 0.3% to 3.2% of cases (44% to 60% of erosive forms) in patients between the ages of 50 and 70, on average 2.6 to 6.5 years after onset of lichen planus.^{1,2} Fifty to sixty per cent of cases occur in men.^{2,3} Contributing factors are sometimes noted (e.g., stress, family history, local irritation, alcoholism, dental abnormalities, nutritional disorders, systemic diseases).⁴ This deterioration occurs on the tongue (30%), lower lip (16%), gums and palate.⁵

SCC is well differentiated and generally multifocal (10%) and recurring (33%).¹ Prognosis depends on the stage of the tumour.³ Lymphatic metastases are seen in 24% of cases and mortality can reach 40% in 16 months.

Monitoring patients with oral lichen planus is useful in detecting deterioration or relapse at an early stage.⁴ ♦

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Sleep Apnea and Dental Orthotics

I read the interesting articles on dental orthotics in *JCDA*.^{1,2} Dental orthotics can also be used for the treatment of sleep apnea. However, sometimes a surgical approach is necessary to treat severe sleep apnea, which can lead to several devastating medical conditions. Many patients cannot tolerate continuous positive airway pressure (CPAP) treatment or mandibular advancement devices. Also, mandibular advancement devices are not always helpful for patients with severe sleep apnea. CPAP and mandibular advancement devices must be used every night, and many patients can't comply with treatment. For these patients, maxillary advancement and advancement genioplasty will resolve sleep apnea in almost 100% of cases. This is life-saving surgery for patients who cannot tolerate CPAP or oral devices. Many oral and maxillofacial surgeons have used this surgical approach to treat patients with sleep apnea and have obtained excellent results. *JCDA* should make dentists aware of this therapy. ♦

Dr. Howard Phillips
Toronto, Ontario

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Interpreting Radiographic Radiolucencies

We were interested to note that what is shown at the apex of tooth 38 in Fig. 1 of the article on retained third molars¹ was interpreted

as a radiolucent lesion. We have studied these radiolucencies around the apices of the roots of the third molar. In our retrospective radiographic study of 822 patients with 1,546 mandibular third molars, we found this radiolucency to be present in 7.8% of our sample.² Although our study was limited by the lack of complex imaging, surgical exploration and microscopic findings, based on the signs and symptoms obtained from a chart review, we believe it is very unlikely that these shadows represent pathology but rather are variations of normal anatomy. ♦

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Response from the Authors

Figure 1 of our article¹ is of a 54-year-old man with reported symptomatology associated with tooth 38. The tooth was removed and a biopsy of the apical radiolucent lesion was performed. The pathology report had a final diagnosis of a lesion “consistent with solitary bone cyst.” The patient proceeded to have an uneventful recovery and continues to do well.

The point of the article was that all clinically suspicious lesions should be investigated by clinicians who choose to undertake surgical responsibility of their patient. In some instances these radiolucencies may in fact turn out to be artifacts. However, as the article purposes, the

need for proper referral and appropriate radiographic follow-up is mandatory if pathology is suspected and if the required treatment is out of the clinician's realm of expertise. ♦

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Dr. Albert Haddad
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Reference

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Recognizing acid erosion can be as simple as switching on a light.

Challenges in oral health are evolving

Despite success in reducing the prevalence of caries and periodontal diseases, dentistry now faces new concerns. A spectrum of degenerative conditions is at the forefront of dental issues — specifically the multifactorial challenge of tooth wear.



The healthy diet paradox

Tooth wear has much to do with the modern, health-conscious lifestyle- and diets that are high in acid. Acidity from fruit juices and soft drinks demineralize and soften the tooth surface, making it more susceptible to wear.

Early intervention is key

Increasing patients' awareness of tooth wear during routine examinations, along with lifestyle advice, may help to prevent sensitivity. It may also help prevent the need for major restoration.

Expert advice is now available

As awareness grows about acid erosion, so too does the need for public education and dental management for long-term dental health. With this in mind, product innovation and public education are high on our agenda.

For expert guidance on signs, symptoms and management you can switch on a light or visit www.dental-professional.ca

CDA Joins Forces With Influential Small-Business Organization



Official signing ceremony of the CDA-CFIB Letter of Agreement (l. to r.): Mr. Garth Whyte, CFIB executive vice-president, national affairs, Ms. Catherine Swift, CFIB chair, president and CEO, Mr. George Weber, CDA executive director, Dr. Jack Cottrell, CDA immediate past-president, and Dr. Wayne Halstrom, CDA president.

At CDA's Board of Directors meeting in April 2006, representatives of CDA and the Canadian Federation of Independent Business (CFIB) signed an historic letter of agreement, signalling a formal intent that both associations would collaborate on a joint marketing pilot project on a trial basis through to July 2007.

JCDA talked with the 2 signatories of the agreement, Dr. Jack Cottrell, CDA immediate past-president, and Ms. Catherine Swift, chair, president and CEO of CFIB, about the significance of the partnership.

"CDA and CFIB have always had a very good relationship," notes Dr. Cottrell. "We have worked well with CFIB in the past and this agreement will build upon that foundation and lead to an even stronger alliance in the future."

Ms. Swift also acknowledges the importance of past relations between the 2 organizations. "Part of the reason this agreement came to fruition is due to the successful, collaborative relationship we've enjoyed with CDA. In working with CDA, we became familiar with many of the key players within the Association," she adds.

The most significant collaboration between the 2 groups was a sustained and focused lobbying campaign to raise individual RRSP contribution limits. In its 2003

budget the federal Liberal government agreed to increase these RRSP levels incrementally, and they have since risen from \$14,500 in 2003 to \$18,000 in 2006.

Partnership is a Win-Win Situation

Dr. Cottrell sees the partnership as an opportunity for CDA to learn more about CFIB's unique membership structure. "CFIB has established itself as an effective national organization with local, provincial and national characteristics," he says. "This blends well with CDA's renewed emphasis on developing a more collaborative approach with its corporate members." In keeping with this sentiment, CDA will inform the provincial dental associations about how this unique partnership with CFIB unfolds.

"We first approached CFIB during the development stages of CDA's affinity program, to explore potential avenues to obtain leverage from their substantial membership numbers," explains Dr. Cottrell. "These talks opened the door to further discussions on how we could build an even closer relationship with CFIB."

"While CDA and CFIB will maintain their individual priorities and identities, we will also try to uncover and develop potential synergies that will bring value to our members," he says. "We are both very successful associations, and we will explore how we can pool our energy

and resources to give our members more value for their membership dollar.”

Ms. Swift is also confident that this new joint marketing initiative will benefit both organizations. “We are complementing each other’s strengths. CFIB is regularly acknowledged as one of the most influential business groups in the country, but we can learn more about the medical professional sector from working closely with CDA.

“While this letter of agreement outlines an intention to collaborate on a marketing project, implicit is the notion that, as we have in the past, when an issue of interest to both of our memberships arises, we will join together to give our advocacy efforts some added strength,” continues Ms. Swift.

Business Know-How for the Dental Practice

A key objective of this partnership is to explore the implementation of a cooperative marketing plan that would ultimately increase membership for both associations. “Many dentists are currently members of CFIB, but we envision this agreement as paving the way for CFIB to be able to offer a higher level of value to dental practitioners,” says Ms. Swift. “While dentists excel at the medical/professional aspect, CFIB can assist CDA members with the business side of running a dental practice.”

Ms. Swift goes on to explain: “We offer several online courses which review a variety of everyday business matters that our members, or sometimes their employees, find quite useful. In fact, one of our most popular pieces is what a small business can and should do in preparation for a tax audit.”

35 Years of Small Business Advocacy

This year marks the 35th anniversary of the formation of CFIB. The group began as a political action organization for small and medium-sized businesses in Canada, acting as a “big voice for small business” in the public arena. It has now grown to represent a diverse group of over 105,000 members, drawn from the business and professional sectors across Canada.

Respected and renowned for its advocacy efforts with governments at all levels, CFIB has engaged in such successful lobbying campaigns as the previously mentioned increase of the individual RRSP contribution ceiling, the creation of the small business corporate tax rate, capital gains exemption for small business and farmers, improved thresholds on corporate tax rates and tax reductions in general.

On top of its advocacy efforts, CFIB has also established itself as an organization that produces extensive research on the small to medium-sized business market in Canada. “We work collaboratively with the Bank of Canada on economic data and with most major government ministries and the finance industry, thanks to our unique ability to analyze the private, small business sector of the economy,” says Ms. Swift. “Our data are now considered the best sources of information around on this sector,” she emphasizes.

Engaging Members on Key Issues

“One of our basic principles of operation is that we always consult our members before we take a position on any issue,” explains Ms. Swift. “One member one vote’ is our credo. The member with a 1-person operation has the same vote as the owner of a 50-person business.”

CFIB is able to quickly gauge its members’ views by performing surveys via email or fax. “The great thing about CFIB is that our members are the actual business owners — the decision makers,” she says. “This is who we are able to survey and it helps enormously to go directly to the decision makers in an organization.

“Our members continue to tell us that lowering personal income taxes is very important to them,” she notes. “This is very relevant to dentists because, as most are aware, with a private company your business financials are closely tied to your personal finances.”

Easing the overall burden of paperwork imposed by all levels of government on small business owners is another area where CFIB dedicates significant energy and resources. Mr. Garth Whyte, CFIB executive vice-president, national affairs, is co-chairing the Advisory Committee on Paperwork Burden Reduction, a committee created by Industry Canada to measure the impact of regulatory compliance on small businesses and to identify initiatives for reducing the paperwork burden.

As for future CFIB initiatives, Ms. Swift reveals the development of a small business certificate program. “This online program will be a comprehensive, module-based course covering topics like the fundamentals of marketing, human resources, how to read a balance sheet and other key elements of running a business.” CFIB hopes to launch this new service in October 2006 during Small Business Week. ♦

For more information on CFIB and the benefits of membership for individual dental practices, visit www.cfib.ca/dental (password “dental”).

Latest CDA Member Benefit Delivers Clinical and Practice Management Information Directly to Dentists' Desktops



To find out how to start receiving eTOC email alerts, visit www.cda-adc.ca/etoc or contact the CDA Resource Centre at 1-800-267-6354, ext 2225.

In May, the CDA Resource Centre launched a new current awareness email service exclusively for CDA members. The Electronic Table of Contents (eTOC) service allows members to receive the table of contents from a customized selection of over 200 dental, medical and general interest serial publications.

How eTOC Works

After completing a simple registration process via the CDA website, members will receive table of contents email alerts as soon as the CDA Resource Centre receives new editions of their chosen titles. This eTOC alert will be sent directly to members' preferred email address.

The eTOC alerts include either a direct link to the journal publisher's website or to a scanned PDF file of the publication's table of contents. While some publishers choose to make full-text articles or abstracts freely available online, other articles of interest are accessible by subscription only. Members can order these articles through the CDA Resource Centre at a special member rate.

Members can choose to receive table of contents information from as many CDA Resource Centre collection newsletters and journals as they wish. The service also allows members to add or delete journal selections as often as desired. Publication titles can be selected by category, title or keyword.

This new service is provided to CDA members at no additional cost. It will reduce the time members spend searching journals and other scholarly publications for relevant clinical and practice management information.

This latest member benefit is part of a suite of services launched by CDA in recent months. The LEXI-COMP Online, CDA Edition (clinical information databases), the Member Savings Centre affinity program and now the eTOC service all demonstrate CDA's commitment to provide its members with tangible benefits. ✦

Here's a way for Parliament to honour Heather Crowe.

Make federally regulated workplaces 100% smoke-free

Heather Crowe dedicated the last years of her life to ensuring that all workers would be protected from the risks of second hand smoke. She persuaded governments to recognize second hand smoke as an occupational health hazard.

The best way to honour Heather Crowe is to ensure that all workers in federally regulated workplaces are protected from the occupational hazard that took her life.

The federal Non-smokers' Health Act is now weaker than provincial measures. When this Act was passed in 1988 it was ahead of its time. By today's standards it is too weak, and federally regulated workers have less protection than other Canadians.

We urge all parliamentarians to work together to strengthen federal law to ensure all federally regulated workplaces in Canada are 100% smoke-free.

Canadian Coalition for Action on Tobacco - CCAT
Action on Smoking and Health
Canadian Cancer Society
Canadian Council on Tobacco Control
Canadian Dental Association
Canadian Medical Association
Coalition québécoise pour le contrôle du tabac
Heart and Stroke Foundation of Canada
Non-Smokers' Rights Association
Ontario Campaign for Action on Tobacco
Physicians for a Smoke-Free Canada
The Lung Association



Photograph by Peter Zivkovic

CDA Becomes Full Voting Member of Tobacco Coalition

CDA became the seventh full voting member of the Canadian Coalition for Action on Tobacco (CCAT) on May 16. Voting membership privileges are given to health and professional organizations that have demonstrated a high standard of support for the tobacco control movement.

CDA has long been active in the fight to eliminate tobacco use in Canada and eradicate the oral diseases caused by tobacco, including successfully lobbying for the introduction of graphic tobacco warning labels on cigarette packages and educating dentists about the important role they can play in assisting patients to quit smoking.

As an active member of CCAT, the Association has been lobbying for stronger tobacco regulation in Canada, including full implementation of the Framework Convention on Tobacco Control and revising the Federal Non-Smokers' Health Act to ensure that all federally regulated workplaces in Canada become 100% smoke-free.

Most recently, CDA and CCAT collaborated to promote World No Tobacco Day on May 31 by placing an advertisement in *The Hill Times*, urging Parliament to honour tobacco control advocate Ms. Heather Crowe, who died of cancer on May 22, 2006, at the age of 61. ✦

Annual General Meeting Highlights



Manitoba was well-represented at the AGM with (l. to r.) Dr. John Perry, associate professor at the faculty of dentistry, University of Manitoba, Dr. Johann de Vries, dean of dentistry, University of Manitoba, the Honorable Steven Fletcher, member of Parliament for Charleswood-St James-Assiniboia, and Dr. Philip Poon of Winnipeg, chair of CDA's Committee on Government Relations and Public Advocacy.

CDA's 2006 General Assembly and Annual General Meeting (AGM) were held April 28 and 29 in Ottawa. This year's meetings were characterized by a renewed spirit of cooperation and collaboration between CDA, the provincial dental associations, and regulators and specialty groups on several important issues, including governance, ITRANS and dental hygiene.

Of particular significance this year, the General Assembly welcomed a federation of the Northwest Territories & Nunavut Dental Association and Yukon Dental Association as a corporate member with full voting rights. Dr. Hassan Adam and Mr. Kevin Stapleton were in attendance as representatives of the federation.

Election Results

Among other duties, the General Assembly is responsible for electing members to the CDA Board of Directors. In this year's elections, Dr. Deborah Stymiest of Fredericton, New Brunswick, was acclaimed as CDA vice-president. Dr. Stymiest will become the first female president of CDA in 2008–2009, following the terms of current CDA president Dr. Wayne Halstrom of Lions Bay, B.C., and CDA president-elect Dr. Darryl Smith of Valleyview, Alberta. Rounding out the Board are: Drs. Robert Sutherland of Toronto, Ontario, Don Friedlander of Ottawa, John A. (Jack) Scott of Edmonton, Alberta, and Robert MacGregor of Kentville, Nova Scotia.

In other results, Dr. Ronald Markey of Delta, B.C., was elected as chair to the General Assembly.

Guest Speakers

The Honorable Steven Fletcher, Conservative member of Parliament and parliamentary secretary to the Minister of Health, addressed the AGM and gave an update on government activities that support the evolving role of oral health in the overall health care system. He commended dentists and CDA on their positive work and noted the close relationship that he has developed with CDA and its representatives.

Mr. Richard Alvarez, president and CEO of Canada Health Infoway, spoke at the plenary session, providing an overview of Infoway's mandate and actions to date in support of the development and implementation of the Electronic Health Record (EHR) in Canada. Mr. Alvarez commended the efforts that dentists and CDA have already made to engage in EHR discussions and encouraged a continued effort at the federal, provincial and local levels of government.

Working Groups and Task Forces

CDA's current governance structure allows for the creation of working groups and task forces to address specific issues or concerns. Coming out of this year's General Assembly and AGM, 4 new groups are being formed: the Governance Review Working Group, the Working Group on ITRANS/e-business, the Dental Hygiene Task Force and the CDA/Corporate Member Relationship Task Force. In addition, CDA and the Ontario Dental Association have agreed to continue discussions in the hope of providing joint membership to the dentists of Ontario, with less duplication.

Interactive Sessions

Three interactive sessions were offered this year. In the session on ITRANS, participants received a presentation from an independent consultant, who concluded that there was sufficient merit in the ITRANS go-forward strategy to warrant support for it, provided that a collaborative approach was adopted. The session on governance began with a presentation on the history of CDA's current governance structure and continued with group discussions. The ultimate goal in revising the governance is to arrive at a structure that everyone can support, that facilitates good communications and that promotes effective decision-making. Finally, in the interactive session on EHR, participants identified potential sources of funding for the EHR, barriers to implementation, EHR benefits, how best to involve dentistry and privacy concerns. ♦

Medicated Tooth Coating Earns CDA Seal of Recognition

CDA recently awarded Prevora medicated tooth coatings, manufactured by CHX Technologies, Inc., with a Seal of Recognition in its Professional Product Recognition program (PPR). Prevora is a chlorhexidine varnish that has been shown to be an effective decay preventive agent for adult tooth decay at the gum line.

CDA's PPR program recognizes products used by dentists in their practice. Along with chlorhexidine rinses, other PPR Seal of Recognition categories include surgical gloves and full-spectrum lighting.

The Seal of Recognition is designed to help the public and dental professionals make informed choices. CDA reviews submissions from manufacturers to verify the acceptability of research methodology and evidence that the statement of claim made by the manufacturer can be scientifically supported. ♦



REMINDER

DAT Deadlines

The registration deadline for the next Dental Aptitude Test (DAT) is Friday, September 15, 2006, for the November 4, 2006, test date.

The subsequent registration deadline is Monday, January 15, 2007, for the February 17, 2007, test date.

For additional information, visit the CDA website at www.cda-adc.ca/dat

To access the websites mentioned in this section, go to July/August's JCDA bookmarks at www.cda-adc.ca/jcda/vol-72/issue-6/index.html.

2006 National Oral Health Month Campaign Has Wide Reach

CDA's 2006 National Oral Health Month (NOHM) campaign messages appeared in several prominent publications, reaching an estimated circulation of almost 3 million Canadians.

This year's campaign focused on the importance of oral health in relation to overall health and the importance of the dentist in the delivery of complete oral health care, with a special emphasis on seniors' oral health.



The NOHM campaign was publicized through a series of print articles distributed to daily, weekly and community newspapers and online editors across the country. CDA's print advertising campaign (featuring the graphic of a crossword puzzle) appeared in various national magazines and daily newspapers.

In April, CDA participated in joint venture print initiatives with the *National Post* and *Reader's Digest* (and its French-language equivalent *Sélection*). Among the editorial content included in these publications were articles on the effects of junk food on oral and systemic health, seniors' oral health issues and the oral health-general health relationship.

To further communicate its oral health messages to patients, including those in their senior years, CDA produced and distributed a public awareness promotional tent card to dentists in Canada. Dentists are encouraged to display this resource in patient waiting areas throughout the year. The crossword puzzle graphic from the tent card can also be purchased in poster format from CDA's website at www.cda-adc.ca/en/cda/news_events/health_month/index.asp. ♦

Oral Bacteria Linked to Pre-Term Labour?

In a recent study published in the *Journal of Clinical Microbiology*,¹ the authors report on a possible link between bacteria found in the mouth and the amniotic fluid of a woman who gave birth prematurely.

Researchers examined the amniotic fluid of 34 pregnant women who were being tested for fetal development or suspected infections. Of these women, 6 delivered before 30 weeks and had a higher risk of possible infection. One of these 6 patients was found to have an intrauterine infection. Polymerase chain reaction (PCR) detected the *Bergeyella* strain of bacteria in the amniotic fluid. The bacteria was also present in the woman's subgingival plaque, but not in her vaginal tract.

This study furthers the authors' research examining whether oral bacteria, once entering the blood, can cause various health problems, including pre-term labour. While the woman's periodontal health during pregnancy was unclear, she did not have detectable periodontal disease during postpartum examination.

Bergeyella is one of the approximately 700 bacteria found in the mouth and it cannot be grown in a culture. This particular strain of bacteria has not been previously associated with pre-term birth. ♦

Reference

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JCDA Commentary

Howard C. Tenenbaum, DDS, PhD, Dip Perio, FRCD(C), is a professor of periodontology and associate dean of biological and diagnostic sciences in the faculty of dentistry at the University of Toronto. JCDA sought Dr. Tenenbaum's insights about this study when it was first published.

While I find this report to be quite interesting, it is important to note that employing polymerase chain reaction (PCR) techniques to locate bacterial DNA may indicate that the actual numbers of bacteria could be minute. Even if one cannot cultivate bacteria, it is possible to identify them using immunofluorescent methods.

Identification of a bacterial species does not in and of itself confirm that it is causing disease. If PCR was necessary to detect the presence of the bacteria, one has to wonder about the severity of the 'infection'. It is also not clear if the authors considered looking for DNA from other commensal organisms when using these PCR methods.

The current literature regarding pre-term and low-birth-weight babies (PTLBWB) supports the notion that it is the systemic response to the periodontal infection, such as an increase in

prostaglandin levels, that leads to the early labour rather than the periodontal bacteria themselves.

Therefore, the presence of potentially minute levels of an oral bacterium in the study by Han and others does not seem to correspond to current thinking. In addition, the patients in the study did not have periodontal disease. The combination of these factors leads me to believe that these cases may not be as significant as the authors' claim.

Nonetheless, I do find the study insightful and perhaps further research will determine links between periodontitis and PTLBWB or other systemic diseases, as has already been shown with diabetes.

It should also be noted that other recent articles^{1,2} failed to find convincing and scientifically robust data to link maternal periodontal disease to PTLBWB. The debate concerning this topic will likely remain controversial for quite some time. ♦

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Briefs

▶ ADA Publishes Recommendations for Oral Bisphosphonate Therapy

In June, the American Dental Association (ADA) Council on Scientific Affairs released a list of recommendations on dental management of patients receiving oral bisphosphonate therapy. The recommendations supplement the information ADA previously posted on its website on the use of oral bisphosphonates and osteonecrosis of the jaw (ONJ).

Recent media coverage on the possible relationship between bisphosphonates and ONJ has heightened interest about the issue. Bisphosphonates are medications, administered orally or intravenously, for the treatment of multiple diseases of the bone, including cancer. The majority of reported cases of ONJ have been associated with common dental procedures such as tooth extraction. However, there have been cases where ONJ seems to occur spontaneously in patients taking this class of drugs.

CDA has been following this issue closely and recently compiled information and resources for members who might receive questions from patients or who are treating patients undergoing bisphosphonate therapy. ♦

Related Resources

CDA website article on bisphosphonates (CDA members only):

http://www.cda-adc.ca/en/members/news_publications/member/2006/onj_bisphosphonates_jun20.asp

ADA Council on Scientific Affairs, Dental management of patients on oral bisphosphonate therapy — expert panel recommendations:

http://www.ada.org/prof/resources/topics/topics_osteonecrosis_recommendations.pdf

▶ DIAC Survey Finds Canadian Dentists are Highly Connected

Over 60% of Canadian dental offices are connected to the Internet, according to results from a recent survey conducted by the Dental Industry Association of Canada (DIAC). The 10th annual Future of Dentistry survey was mailed to dental offices across Canada with the February 2006 edition of *JCDA*.

The Internet has become a large part of the personal and working lives of Canadians, and dentists are no different. Of the more than 1,000 practising Canadian dentists who responded to the survey, 61% have Internet connections at the office, an increase from 24% in 2000. More than 97% of respondents have Internet access either at home or the office.

Dentists are using the Internet as a major source of dentistry information, with nearly 91% using it for this purpose. This is a significant increase from 36% in 1997, when Internet use was first reported in the survey.

Overall, nearly 75% of dentists who responded search frequently or occasionally for online dentistry information. The number of dentists purchasing dental products online has also risen from 8% in 2000 to 23%.

Along with a rise in Internet usage, the prevalence of email has also increased, as 46% of respondents report using email at their practice. For the first time, corresponding with patients was the highest ranked email function at the dental practice. Personal messages, correspondence with colleagues, and contacting manufacturers or suppliers rounded out the top reported email uses. ♦

▶ U of T Posts Students' Reports on Common Clinical Questions

As part of their studies, students at the University of Toronto faculty of dentistry answer relevant clinical questions using evidence-based methods. The students work together in groups to identify, critically appraise, synthesize and communicate the available evidence to support clinical decision-making. Each group presents its findings to fellow students and prepares a written report. The following website contains the reports compiled since 2005: www.utoronto.ca/dentistry/newsresources/evidence_based/evidencebasedlearning.html ♦

B.C. Dentist Wins Laser Dentistry Award

In May, the Academy of Laser Dentistry presented The Leon Goldman Award, its award for clinical excellence, to Dr. Glen van As of North Vancouver, B.C. Since graduating from UBC in 1987, Dr. van As has been an assistant clinical professor of restorative and prosthodontic dentistry at UBC's faculty of dentistry. He has delivered dental lasers and related microscope education workshops and lectures throughout Canada and the United States.

CDA Past President Honoured by QDSA

The Quebec Dental Surgeons Association (QDSA), on the occasion of its 40th anniversary, honoured CDA past president Dr. Barry Dolman of Montreal, for his contributions to the Association by bestowing upon him the title of Life Member at a ceremony during Les Journées Dentaire du Québec in May.

Oral Immunologist Receives the Advil-Micheline-Blain Award



Dr. Noëlla Deslauriers with Mr. Raymond Martineau of Wyeth Consumer Healthcare Inc.

The Network for Oral and Bone Health Research, in conjunction with Wyeth Consumer Healthcare Inc., presented its Advil-Micheline-Blain Award to Dr. Noëlla Deslauriers of Laval University. The award, commemorating former QDSA president Dr. Micheline Blain, is given in recognition for the exceptional contribution of a scientist, clinician or administrator whose work, vision or influence has had an impact on the evolution of oral health. In addition to her role as a researcher in oral immunology, Dr. Deslauriers previously

served as director of the Network and as vice-dean of research at Laval.

Students Awarded John Sherman Prize

The charitable foundation of the Alpha Omega Fraternity of Canada awarded 10 Alpha Omega students with the John Sherman Prize. Honouring one of the founders of Alpha Omega in Canadian dental faculties, this award is presented to second- and third-year dental students in Canada who best exhibit scholastic ability along with leadership in their schools and community. This year's winners are Melissa Goodman, Jennifer Hittner and Mary Ellen Polymeris (Toronto), Lindsey Jakubovic (McGill), Cameron Zealand, Jordan Klimitz and Asha Madhavji (Manitoba), Bradley Lands (Montreal), Jonathan Madras (Western Ontario) and Allen Aptekar (Saskatchewan).

ODA Appoints New President



Dr. Ian McConnachie

Dr. Ian McConnachie of Nepean was appointed president of the Ontario Dental Association (ODA) in June. A 1975 graduate of the University of Toronto, Dr. McConnachie began his dental career by serving remote communities in northern Ontario from Sioux Lookout. He has maintained a private practice in pediatric dentistry for over 25 years and has been a staff pediatric dentist at the Children's Hospital of Eastern Ontario in Ottawa.

ADA&C President Announced



Dr. Randall Croutze

The Alberta Dental Association and College (ADA&C) elected Dr. Randall Croutze of Edmonton as its new president. A 1985 graduate of the University of Alberta, Dr. Croutze has served as president of the Dental Undergraduate Society, the University of Alberta Academic Staff Association and the Edmonton & District Dental Society. He is a clinical associate professor at the University of Alberta department of dentistry.

New President of NSDA



Dr. Dean Miller

The Nova Scotia Dental Association (NSDA) named Dr. Dean Miller of Dartmouth as its new president at the NSDA annual meeting in June. A native of Placentia Bay, Newfoundland, Dr. Miller earned his DDS from Dalhousie University faculty of dentistry in 1990. He currently has a private practice in Dartmouth.

Dentist Appointed as Quebec's First Health Commissioner

Dr. Robert Salois was recently named health and welfare commissioner for the province of Quebec for a 5-year term. Beginning on August 14, Dr. Salois' new responsibilities will include assessing the results achieved by the province's health system and proposing a Patients' Bill of Rights that will set out the rights and responsibilities of citizens within the health system.

Dr. Salois is the current president of the Canadian Dental Regulatory Authorities Federation. He has also served as president of the Order of Dentists of Quebec (ODQ) since 1994. Dr. Salois recently announced that he will not renew his mandate as ODQ president in October.



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Dental Industry Leader Michel Hart Contributes \$250,000 to the Oral Health Good For Life Campaign™*

The Dentistry Canada Fund – *The Canadian Charity for Oral Health* – announces with sincere gratitude Mr. Michel Hart’s outstanding and generous \$250,000 contribution to its *Oral Health - Good For Life™* Campaign. With Mr. Hart’s magnanimous donation the Campaign, launched only last April, has already passed the \$1,000,000 mark in its goal to establish a \$10 million endowed fund that will result in an annual investment of \$500,000+ for research and education programs addressing the issues surrounding the silent epidemic of oral diseases in seniors and the links between oral health, systemic diseases and their impact on overall general health.

Throughout his long-time distinguished dental industry career – more than 20 years as CEO and chairman of Ash Temple Ltd. and currently chairman of Alliance H. Inc – Mr. Hart has continuously

demonstrated a sincere and generous partnership of “giving back” to the dental profession and the oral health needs of Canadians. But with this latest gift made through Alliance H, the Hart family’s holding company, which owns and operates Conex Cabinets, Dentech Equipment and Microbex Infection Control Products, he modestly says, “It’s more than just giving back. I really feel it’s an investment in the health and well-being of our fellow citizens

for years to come. With increasing evidence pointing to the relationship between oral disease and overall health I believe all of us share a responsibility to do everything we can to improve the quality of life for those families everywhere who require the expertise and care the dental profession is so capable of providing.”

In his message of thanks to Mr. Hart, DCF Chairman Dr. Bernie Dolansky – who shares the Chair of the National Campaign Cabinet with Mr. Hart – pointed out Michel’s years of generosity to the dental profession. Michel was quick to respond, “I suppose, but that’s the past and do you know what I like most about the Oral Health - Good for Life Campaign? It’s not about yesterday. It’s now. And it’s now targeted directly at a multitude of Good for Life Health Needs for thousands of tomorrows. Who can resist supporting such a worthy program?”

“Who can resist supporting such a worthy program?”

Michel Hart,
Chairman,
Alliance H. Inc.

Alliance H. Inc

For more details about this transformational campaign, please contact Richard Munro, Campaign Director, toll-free at 1.877.363.0326.

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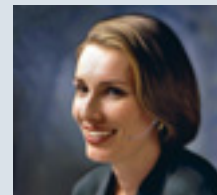


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Hong Kong Travelogue

By Tin Chun (T.C.) Wong, BDS, LDSRCS, MSc Orth, D Orth RCS, FHKAM, FCDSHK



Hong Kong Stopover

For those of you travelling to Shenzhen, China, to attend the FDI Annual World Dental Congress, a visit to Hong Kong is a great way to start or end your trip. The most convenient way to travel between Hong Kong and Shenzhen is a 45-minute train journey on the Kowloon Canton Railway. Canadian passport holders are normally granted visa-free entry into Hong Kong for up to 90 days.

I find Hong Kong to be one of the safest cities in the world and people can walk alone with confidence, even at night. English is widely spoken and there is usually no problem communicating with people in most hotels, restaurants and taxis. In September, the weather in Hong Kong is generally mild and sunny, making it a wonderful time to visit this city famous for its shopping, nightlife and gastronomic delights.

Getting Around

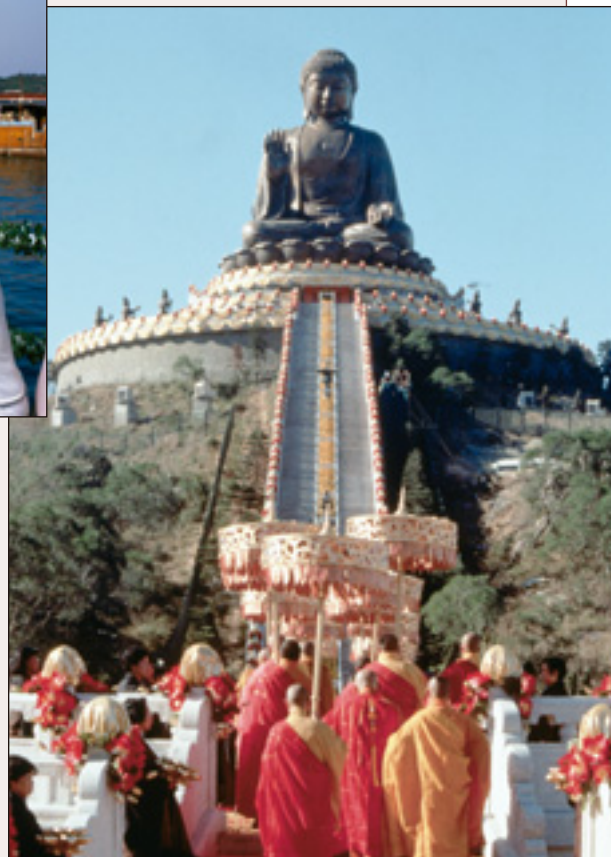
The geography of Hong Kong is such that islands, mountains, harbours and waterways dominate the landscape. Making your way between the islands and the mainland is all part of the travel experience. For instance, taking the Star Ferry is a great way to see both Kowloon and Hong Kong Island. This 8-minute ferry ride takes you right through one of the busiest harbours in the world.

Public transportation in Hong Kong is inexpensive, reliable and efficient and most of the population uses this method. The underground train, known as the MTR, will get you to most places in the city, and buses and minibuses run until late into the night. Another affordable way to see Hong Kong Island is by tram. Return journeys are on offer, running from east to west across the island.

Sampling the culinary delights of Hong Kong.
Photo courtesy of Hong Kong Tourism Board



The Star Ferry cuts its way through the Hong Kong harbour.
Photo courtesy of Hong Kong Tourism Board



Visit the Giant Buddha at the Po Lin Monastery on Lantau Island.
Photo courtesy of Hong Kong Tourism Board

I also recommend finding time to visit 2 of the most scenic viewpoints of Hong Kong. Perhaps the most famous view of Hong Kong is enjoyed from atop Victoria Peak. A delightful way to reach the top is by the Peak Tram. You will also be spellbound by the breathtaking 360-degree view on the 5.7 km cable car ride to the home of the Giant Buddha at the Po Lin Monastery high atop the Ngong Ping plateau on Lantau Island.

Shopping Districts

Shopping is a major pastime in Hong Kong and there are plenty of stores to please most travellers. The elegant shops and boutiques of the major fashion labels are found within Hong Kong's central district and Kowloon's Tsim Sha Tsui district.

The variety of goods on offer and the level of excitement of the Ladies' Market will astound you. The Market's open-air shopping streets stretch from Kowloon's Tung Choi Street in Yau Ma Tei to Fa Yuen Street in Mongkok. The streets are alive with activity all day but are particularly colourful at nighttime. The Jade Market in Yau Ma Tei is the best place to purchase jade jewelry and souvenirs but it closes at night. Remember to bargain in the open market.

Causeway Bay and Tsim Sha Tsui offer the largest variety of camera and electronic equipment stores. If you are looking for shopping malls, there is the Landmark and Pacific Place on Hong Kong Island as well as Festival Walk, Ocean Terminal and Harbour City in Kowloon.

Restaurants and Nightlife

There is no shortage of restaurants in Hong Kong, as most people dine out at least once a day. For a glamorous and elegant dining experience, La Plume at the Hotel Intercontinental, Tsim Sha Tsui, serves some of the finest cuisine in the world and offers a wonderful view of Hong Kong Island. The best tables are by the window — diners sit side by side, seemingly floating on the water while looking at Hong Kong's central district and Victoria Peak.

From atop Victoria Peak, I would suggest dining at the Peak Restaurant or at the Café Deco at the Peak Galleria. Remember to ask for a table by the window at Café Deco for the best views of Kowloon.

Yung Kee restaurant on Wellington Street in central Hong Kong offers some of the tastiest Cantonese food and its barbecue goose is highly recommended. Across the street is the slightly less elegant Tsui Wah restaurant, famous for its Hainanese chicken rice and Cantonese club sandwich.

D'Aguilar Street is home to Delifrance, the best value for money when it comes to coffee and pastries. This street lies within the Lan Kwai Fong district, an area packed full of restaurants and bars and famous for its

bustling nightlife. Further uptown is Hong Kong's SoHo district (south of Hollywood Road) where it seems that every other storefront is a restaurant!

If you choose to venture south on Hong Kong Island, Stanley Market is a nice destination. Stanley was once a quiet fishing village, but a number of good restaurants and bars have opened recently. Finally, you can enjoy a memorable meal at the Jumbo restaurant located in Aberdeen. A short ride on a sampan takes diners out to this floating restaurant anchored just offshore.

Additional Activities

If you are travelling with children and looking for theme parks, try Ocean Park on Hong Kong Island or Disneyland on Lantau Island.

The Cultural Centre on Kowloon's Tsim Sha Tsui is a popular venue for artistic, musical and dramatic performances. The Centre is located on the Avenue of the Stars, which runs alongside the Kowloon harbourfront.

Birders will have a great time in Mai Po Marshes, renowned as a birdwatcher's paradise. In autumn and winter, thousands of migratory birds come to Mai Po, including over 70% of all Hong Kong bird species and one-third of all bird species in China. ✨

Dr. Wong is an FDI Councillor. She maintains a private orthodontics practice in Hong Kong.

Online Resources

Complete details about all of Hong Kong's delights can be found on the Hong Kong Tourism Board website at www.hkta.org.

Other websites that you may find useful include:

Kowloon Canton Railway: www.kcrc.com

Hong Kong Tramways: www.hktramways.com

Star Ferry Company: www.starferry.com.hk

Hong Kong Mass Transit Railway: www.mtr.com.hk

Hong Kong Mai Po Marshes: www.wwf.org.hk/eng/maipo

Lan Kwai Fong, bars and restaurants: www.lankwaifong.com

Victoria Peak shops and restaurants: www.thepeak.com.hk

Is there a gap in your patients' oral care routine?†

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Using Listerine* just twice a day reduced plaque by **51.9% (2.37 to 1.13)†** and gingivitis by **21% (1.81 to 1.44)§** more than brushing, flossing, and rinsing with control mouthwash.¶

Gingivitis is prevalent² (75% of adults) yet, when asked, only six percent believe that they have the disease.³**

Tell them they can help reduce gingivitis 30 seconds at a time††



In a 2001 survey (n=1000), **81%** of Canadians said that they will use a mouthwash regularly if recommended by their Dental Professional³**

Remind them to Listerine*

Indications: Listerine* Antigingivitis-Antiplaque-Antiseptic-Antitartar-Anticaries mouthwashes kill the germs that cause gingivitis, plaque and bad breath. Tartar Control fights tartar build-up better than brushing alone (when compared to regular toothpaste). Fluoride Listerine* prevents caries.

Cautions: Keep out of reach of children. Do not swallow. In case of accidental ingestion, contact a Poison Control Centre or doctor immediately.

†Brush, floss, rinse

‡Whole-mouth mean plaque index (PI) scores

§Whole-mouth mean modified gingival index (MGI) scores

¶A randomized, 6-month, controlled, observer-blind, parallel-group clinical trial conducted according to ADA Guidelines; n=237 healthy subjects with mild-to-moderate gingivitis evaluable at both 3 and 6 months. Subjects rinsed twice daily for 30 seconds with 20 mL at least 4 hours apart. Based on home use.

**In a survey of 1000 adult Canadians, selected to be representative of the Canadian population.

††Rinse full strength with 20 mL for 30 seconds twice a day.

1. Sharma, NC, et al. Adjunctive benefit of an essential oil-containing mouthrinse in reducing plaque and gingivitis in patients who brush and floss regularly: A six-month study. *JADA* 2004 April;135:496-504. 2. Oliver, RC et al. Periodontal diseases in the United States population. *J Periodontol* 1998 February; 69(2): 269-78. 3. Ipsos Mouthwash Omnibus Study for Pfizer. December 20, 2001.

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This month's feature of THE DENTAL ADVISOR is taken from the March 2005 issue, Vol. 22, No. 2.

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Electric Handpieces

Benefits of Electric Handpiece Systems

Constant Speed and Torque

An air-driven handpiece rotates at 300,000 to 350,000 rpm; however, when placed under load, the handpiece actually cuts at 180,000 to 200,000 rpm. An electric handpiece maintains a constant speed of 200,000 rpm. The constant torque of an electric handpiece eliminates the stalling or reduced speeds experienced when using an air-driven handpiece to cut through crowns or other dense materials.

Concentric Cutting

The constant torque produces a concentric cutting motion as speed is maintained. The feather motion needed when using an air-driven handpiece results in varying degrees of irregularities at the margin of a preparation. The gears of the electric handpiece hold the bur in a locked position to prevent the wobble or vibration of the bur that is often experienced when using an air-driven handpiece. Constant torque and stabilization of the bur allow a concentric motion that ultimately produces a smooth, even margin.

Reduced Noise

While no handpiece is truly quiet, the electric handpiece produces a much quieter noise than the high-pitch sound of the air-driven systems.

Product	Company	Motor Speed Range, rpm	Motor Speed w/ Attachment, rpm
Apex	Lares Research	60-40,000	770-200,000
EA-40LT	A-dec/W&H	2,000-40,000	150-200,000
EA-50LT	A-dec/W&H	300-40,000	3-200,000
ELECTROtorque	KaVo	2,000-40,000	27-200,000
ELECTROtorque plus 701KL	KaVo	2,000-40,000	27-200,000
Midwest eStylus	DENTSPLY Professional/Midwest	1,500-40,000	150-200,000
Optima MX	Bien Air	100-40,000	100-200,000
Optima Plus T&R	Bien Air	20-40,000	20-200,000
SIROTORQUE I EL-1	Sirona Dental Systems	2,000-40,000	87-200,000
SIROTORQUE I SL	Sirona Dental Systems	2,000-40,000	87-200,000
TiMax NL 400	Brasseler USA/NSK	2,000-40,000	2,000-200,000
Titan E-lectric Motor System	DentalEZ Group/StarDental	1,000-40,000	62.5-200,000

*E = external, I = internal, TT = tabletop

**Internally available only in the C Series Treatment Center

***Motor replacement cost

na = not available

ce = currently evaluating

Turbine-free Attachments

Failure of the turbine is the leading cause of malfunction in an air-driven handpiece. Electric handpiece attachments utilize gears rather than turbines. The use of gears allows the handpiece to maintain constant torque and more concentric cutting. While most attachments have two gears, some provide three gears to better distribute the load. This feature reduces the wear on the bearings, resulting in less failure over time.

One Motor/Several Attachments

One motor is used for high-speed and slow-speed attachments with an operating range of 70-200,000 rpm. A large variety of attachments are available for high-speed, slow-speed, endodontic and implant placement procedures.

Manual Control of Operating Speed

The motor speed is easily adjusted to provide precise control of the rotation of the bur for a specific procedure. Most current systems offer a digital display of the current operating speed.

Recent Improvements

Brushless Motors

Early electric motors utilized small brushes in the gear systems. Over time, the carbon brushes wore against the rotors and required replacement. Many of the new motors are brushless, reducing the need for routine maintenance.

Shorter, Lighter-weight Motors

The greatest complaint of clinicians converting to the first electric handpiece systems was the increased weight as compared to air-driven handpieces. Manufacturers have significantly reduced the length and weight of the motor and improved the balance between the motor and attachments.

Fewer Attachments

A wide speed range allows all procedures to be performed using the same electric motor. The first systems required several different costly attachments requiring the clinician to change between steps.

continued on page 510

THE DENTAL ADVISOR Recommends:

ELECTROtorque plus 701KL (97%), ELECTROtorque (96%), Optima Plus T+R (94%), Midwest eStylus (92%), Titan E-lectric Motor System (92%)

92%



Midwest eStylus

(DENTSPLY Professional/Midwest)

92%



Titan E-lectric Motor System

(DentalEZ Group/StarDental)

Other Featured Products



Optima MX
(Bien Air)

Installation Options*	Motor Weight/Length	Auto Reverse	Brushless	Motor Cost	Handpiece Cost	Rating
E	100 g/94.3 mm	Yes	Yes	\$859	200LS-\$899, 40LS-\$749, 10LS-\$779	na
TT, A-dec Cascade-I	79 g/47 mm	No	Yes	\$2,700	\$1,175	na
A-dec 500-I	79 g/47 mm	No	Yes	\$2,800	\$1,250	na
E	94 g/46 mm	No	No	\$1,795	25LPA-\$1,540, 25LHA-\$1,220	96%
E, I – KaVo operatory only	99 g/46 mm	No	Yes	\$2,905	25LPA-\$1,540, 25LHA-\$1,220	97%
E, TT	98 g/51 mm	Yes, w/torque limiting	No	\$2,458	HS-\$1,295, LS-\$1,062	92%
E, I	116 g/66 mm	Yes, w/torque	Yes	\$2,950	\$1,154	ce
E, I	102 g/64 mm	Yes, w/torque	No	E-\$2,100, I-\$2,600	\$1,154	94%
E, I, Retrofit**	100 g/98 mm	Yes	No	\$1,333***	\$551.50 – \$1,499	ce
E, I, Retrofit**	60 g/87 mm	Yes	No	\$1,007***	\$664.25 – \$1,499	ce
E	76 g/147.3 mm	No	Yes	\$1,795	\$400 – \$1,050	na
E, I, TT	106 g/69 mm	No	No	\$1,395	\$825	92%

EDITORS' NOTES: Only products evaluated by THE DENTAL ADVISOR are eligible for listing as a recommended product. Table information provided by manufacturer. Costs are listed for comparison only and are not used to calculate the ratings; all costs shown in U.S. dollars.

Electric Handpieces *continued*

Manufacturers have designed attachments that can be used for several different applications with control of the speed at the conversion box or on the delivery system.

Reduction in Height and/or Angle of the Attachment

Intraoral attachments for the first electric systems had large heads and steep angles, which became a challenge in areas of limited access. New attachments have been designed to provide easier access. Some manufacturers have reduced the size of the head, while others have reduced the distance from the tip of the bur to the top of the handpiece head. The angle of the attachment has also been reduced to improve access.

Integration into Delivery Systems

The first systems in the United States offered only external air/electric conversion kits. While tabletop models are still available, the new electric handpiece systems can be fully integrated into the tubing of the delivery system.

Auto-reverse

As with all rotary endodontic systems, there is a risk of separating files. Some of the new electric handpiece systems have specific endodontic attachments that automatically reverse when the file engages.

Handpiece Maintenance Systems

Daily maintenance remains essential, prolonging the life of any handpiece and optimal function. Using the proper type of cleaner/lubricant and purging the attachment before sterilization are very important. Automatic handpiece maintenance systems (*QuattroCare/KaVo*; *Assistina 301 Plus/A-dec/W&H*) provide a quick and efficient way to extend the life of a handpiece by ensuring the proper type and amount of lubricant along with thorough purging. ■

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The Basic Elements of Purchasing a Dental Practice

Kenneth J. Glasner, QC

The purpose of this article is to acquaint readers with the primary considerations in the purchase of a dental practice. While the material covered is not exhaustive, it provides a basic understanding of the major processes involved in this type of business transaction.

Stages of an Acquisition

The normal course for the buying and selling of a dental practice as a going concern moves through 3 basic stages: letter of intent, contract of purchase and sale, and closing.

Any acquisition starts with a letter of intent which should clearly indicate that it is a non-binding document and set out the intentions of the parties in its basic form. This is followed by entering into a contract of purchase and sale, usually quite a lengthy document requiring serious consideration by both parties before execution. The transaction would ultimately be completed on the closing.

It is common for this process to take 6 weeks or more from the time the letter of intent is drafted to the closing. During the interval between each stage, the appropriate due diligence is required by both parties and their professional advisors, including a lawyer and an accountant. Rushing through any of these stages invites negative financial consequences.

Most transactions require the preparation of a series of documents, the bulk of which is generally prepared and redrafted by the purchaser's solicitor. While most documents are fairly standard, in some cases the documents require negotiation with the other party or third parties, such as landlords.

Share Purchase or Asset Purchase?

One aspect to consider before drafting the letter of intent is whether the transaction can be accomplished by a share purchase or an asset purchase. A share purchase involves acquiring the shares of the company which holds the dental practice as its asset. An asset purchase involves acquiring the assets that are required for the continuation of the business. Many buyers fail to recognize this distinction, as most picture an acquisition in terms of the business itself rather than the legal definition of ownership.

All too often, a client presents his or her legal counsel with a letter of intent or an outline of a general agreement whereby the 2 parties have already settled upon the terms of the transfer of business by way of assets or shares. After an initial consultation with a legal

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advisor or an accountant, one or both parties may want to rewrite the agreement. Sometimes it is not possible to make modifications, especially if the agreement is binding and one party refuses to change the terms. It is essential to meet with a legal advisor and an accountant before committing to such an agreement.

Components of a Transaction

Any transaction, whether it occurs by way of a share purchase or an asset purchase, is comprised of 3 fundamental elements: parties, price and property.

When settling the terms of any agreement, these 3 components must be identified and agreed upon by both the vendor and the purchaser before creating a binding agreement.

Parties

How the transaction is structured — whether as an asset purchase or a share purchase — will have a significant impact on identifying the legal parties. In an asset transaction, the vendor is the legal and beneficial owner of the assets of the dental practice. The vendor could be either the individual practitioner, or his/her company if the practitioner is incorporated. If the vendor is a company, it is not unusual for the dentist to personally guarantee the obligations of the vendor's company.

In a share transaction, the vendor generally includes the practitioner, his or her spouse and/or a family trust. In certain circumstances, it may be a holding company which owns shares in the vendor's company operating the practice.

Price

While this element appears to be the most obvious, it can often prove to be the most difficult to establish. The determination of a price, and the manner of its payment, can comprise some of the more creative components of a transaction.

Property

In an asset transaction, the property is generally comprised of the tangible and intangible practice assets, including furniture and equipment, inventory, interest in lease and leasehold improvements, goodwill and patient files.

On completion of an asset transaction, the title to these assets will be transferred from the vendor

to the purchaser. The purchaser becomes the new legal and beneficial owner of such assets.

In a share transaction, the property purchased is the shares of the company which owns the practice assets. The operating company which owns the practice will remain entirely intact after the transaction is complete. The company will continue to carry on business as if no transaction had occurred. All ongoing liabilities will continue to be payable and all employee liabilities will continue to accrue. The operating company will continue to be the legal and beneficial owner of the assets.

Purchasing a Dental Practice as an Asset Transaction

The acquisition of a dental practice by way of an asset transaction requires that both buyer and seller consider specific areas such as coming to an agreement on how employees, restrictive covenants, lease terms and cost-sharing agreements will be handled. Dentists should also be aware that the consent of the provincial college or regulatory authority may be required for the change and control of a dental corporation.

BOTH THE VENDOR AND THE PURCHASER SHOULD AGREE ON HOW TO MANAGE EXISTING EMPLOYEES. UNLESS THIS ISSUE IS ADEQUATELY ADDRESSED, THE COST TO THE VENDOR OR PURCHASER CAN BE SUBSTANTIAL.

Employees

Both the vendor and the purchaser should agree on how to manage existing employees. Unless this issue is adequately addressed, the cost to the vendor or purchaser can be substantial.

On completion of an asset sale, the employees of the business will continue to be employees, carrying with them the seniority accumulated from the previous owner. A vendor usually wants the purchaser to agree to continue the employment of all employees and to indemnify the selling dentist from liability for severance pay. If a purchaser does not want to hire any particular staff, he or she may request the vendor terminate the employment of such staff on the closing. All employees must be given proper notice if their employment is to be terminated. Severance pay would only be required if reasonable notice is not given. In determining how much notice (or compensation in lieu of notice) must be given, one must refer to the common law.

Restrictive Covenants

The goodwill of a dental practice is often a major part of its value. This intangible asset

increases as a dental practice establishes a strong reputation or competitive advantage in the marketplace.

Since goodwill will be accounted for in the selling price, the vendor must be prepared to give a reasonable restrictive covenant for the benefit of a purchasing dentist. A common example is to include a clause that prevents the vendor from opening a competing practice in close proximity to the one that just sold. With the assistance of competent legal advice, a reasonable structure can be created which will create a disincentive for the vendor to practise within a defined territory and within a particular time frame.

Lease Terms

A purchasing dentist must be aware of the fundamental lease terms, which include the identity of the parties; the description and area of the premises; the term of the lease, including whether or not there is a right to renew; and the rent, including both basic rent and additional rent.

A vendor usually tries to obtain a release of his personal covenant when the practice is sold. A personal covenant is a clause where the original borrower remains personally responsible for the tenant's obligations under the lease. Usually the vendor must settle for an indemnity from the purchaser, as landlords are under no obligation to give such releases. A careful review of the lease terms is fundamental.

Cost-Sharing Agreements

Many dental practices operate through clinics in which 2 or more dentists share furniture, equipment, lease space and employees. A selling dentist should ensure that all his or her potential liability

under any such cost-sharing agreement is terminated on the sale of the practice.

A purchasing dentist must also fully understand the implications of the cost-sharing agreements, including the potential liability for paying more than the fair share of costs if another dentist does not meet his or her obligations. Usually cost-sharing agreements provide that any one dentist does not have the right to force a partition and sale of the commonly owned or leased assets.

Conclusion

I hope this article gives dentists a better understanding of the elements involved in major transactions as well as specific factors to consider when buying and selling a dental practice. It should stimulate dentists to ask questions of their professional advisors at the appropriate times so that these types of transactions can move to orderly and successful conclusions. ♦

THE AUTHOR



Mr. Glasner practises law in Vancouver, British Columbia, at a corporate and commercial law firm and has acted for a number of dentists during the past 15 years. A specialist in dispute resolution, he helped design a mediation system for dentists for the British Columbia Dental Association (BCDA). Mr. Glasner currently serves as one of BCDA's counsel.

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Dr. Archie Morrison

CAOMS President's Message

Welcome to the July/August 2006 issue of *JCDA*, published in conjunction with the Canadian Association of Oral and Maxillofacial Surgeons (CAOMS). CAOMS is always pleased to partner with *JCDA* and have this opportunity to highlight some of the work our members accomplish, not only in the dental office, but in other areas of interest as well.

In that vein, I would like to discuss volunteerism by Canadian dentists. We don't need to look far to see this in our everyday practices and communities. I am always interested to read about dentists' extracurricular activities, in which they give their time freely to help others. Many of us are involved in organized dentistry at various levels — community associations, coaching minor sport, church committees, home and school and the list goes on. People and groups look to dentists to help with these activities and societal functions and generally get support from those of us who are asked. After all, we are in the service industry; even though it is our job, our primary goal is to care for people's oral health and we should never forget that. We are first and foremost in the business of oral health care and we are all well aware of the relevance of that to overall health.

I would like to focus on volunteerism outside Canada. Canadian dentists who volunteer their time to help people in less fortunate parts of the world are all around us and we may not even be aware of it. Some of us may not even know about the opportunities to participate in these "foreign aid missions."

When I graduated from dental school at Dalhousie in 1982, I learned of a Nova Scotia colleague a few years ahead of me who had gone to Botswana, Africa, for 2 years with CUSO (Canadian University Students Overseas), taking his wife and young family of 2 (and a half!) girls, to do volunteer work after he had been practising for 4 years. How could he afford to do this? Why would he do this? Adventure? Challenge? To see the world?

All I knew at the time was that I admired him and felt it to be a very generous gift of his time and expertise, not to mention the perhaps even bigger sacrifice made by his wife. Many years later, I would learn first hand of the real personal rewards in what he did.

Over the past 24 years, I have encountered many other dentists in Atlantic Canada who have gone on charity missions to all parts of the world. I know that many others across Canada have done and continue to do the same and many have gone on more than one occasion. Why are we so willing to do this? It costs us income, overhead, money to get there, time away from our office (without being on vacation), often time away from our families and perhaps some anxiety in going to a foreign place! I am sure that wherever any of us have gone we have left a mark and those people we helped will remember what the "Canadians" did for their community.

I cannot speak for everyone who has gone on these missions, but I will share what I have felt as a dentist volunteering time and effort in a foreign country. I am fortunate to have been part of a group that has gone to Vietnam 7 times in the past 8 years to perform cleft lip and palate surgery on Vietnamese babies, children and adolescents.

In the early 1990s, Vietnam opened its doors to foreign visitors, and foreign medical teams of various disciplines were invited and volunteered to visit to treat patients, pass along western knowledge and teach Vietnamese doctors. A well-organized government- and big industry-supported group known as the Japanese Cleft Palate Foundation was started by Dr. Nagato Natsume — a Japanese oral and maxillofacial surgeon (OMFS). Dr. Natsume had a keen interest in doing charity surgery missions for cleft lip and palate care all over the third world. One of the first places considered was Vietnam, perhaps due to the history between Japan and Vietnam in the Second World War and Japan's interest in humanitarian aid.

Dr. David Precious, my mentor and colleague, has had a career-long interest in cleft lip and palate and has become one of the world's foremost and recognized leaders and authors in this field. His encounter with Dr. Natsume at international meetings led to an invitation to put together a Canadian team to join the Japanese and expand the treatment capabilities for Vietnamese patients.



Local host, Dr. Viet with Canadian team members (l. to r.) Drs. David Precious, Reg Goodday, Archie Morrison and Lee McFadden.

He did just that and, in 1999, a group of us travelled to Ho Chi Minh City and formed a joint team with a group of Japanese surgeons and anesthetists to help these unfortunate people. A relationship was quickly established and bonds formed between the Japanese, the Canadians and our Vietnamese colleagues. Over the intervening 8 years, we have treated hundreds of patients and have visited each other in our home countries. One highlight was bringing our Vietnamese friends here to Halifax and taking them to a junior hockey game. I am sure they had never experienced anything like that in their lives; they still talk about it!

Getting to Vietnam takes more than 24 hours, usually with an overnight stay in Hong Kong or Japan. The time change is 11 hours from Halifax,



Typical waiting room as Vietnamese patients and their families wait for treatment by the Canadian–Japanese team members.

so jet lag is a given. However, air travel in Asia is a treat — very friendly airline staff, polite and accommodating.

Before our first mission, Dr. Precious had made an earlier trip to a rural location in Vietnam and spent 3 hours in detention in the Ho Chi Minh airport before being cleared to enter the country. The knowledge of this, coupled with the news of an American surgeon being killed in Ho Chi Minh just 3 weeks before our departure, had me asking myself, “Why am I doing this?”

The 1999 Canadian team included David Precious, Reg Goodday and me (all OMFSs in Halifax), Lee McFadden (OMFS in Winnipeg) and Dr. Michael Murphy (anesthesiologist in Halifax). Except for Dr. Precious, we didn’t know what to expect. We arrived on a Sunday night and the air was steamy, it was so humid and hot. The officials at the counters looked more like army guerillas than customs agents. There was no small talk or smiles from these folks! People were lined up outside the airport doors like rows of onlookers waiting for the arrival of a national celebrity. Because you weren’t allowed to wait inside the airport, this was how relatives greeted their loved ones. Our first encounter was with Dr. Viet, the female chief of maxillofacial surgery who would coordinate our mission. We found her so modest and charming that we all “fell for her” immediately and later found her to be one of the most skilled surgeons we had ever met.

After considerable delay during which we were unable to get into our rooms at a university residence, we were transferred to a hotel that would become our “home away from home” that first year and every subsequent year since. This proved to be a blessing in disguise as it was air conditioned, had Internet access, the staff spoke English and it was across the street from our hospital. Each year now we go directly to this hotel and meet up with our Japanese friends and colleagues.

On each mission, the first day after we arrive is spent screening patients. The hallway is akin to a waiting room at a busy bus station. Word has been sent out that the Canadian–Japanese team is there, and families bring their children for treatment from all over. Extended family members come along and are quite happy to stay in a room with 5 or 6 families together. Sometimes it has not been possible to operate on all the patients presenting and this is the most heart-breaking part of these missions. Because resources are not what we are used to, the most important part of our mission is



Unilateral complete cleft lip before and immediately after surgery.

to have a safe one and try not to overstress the staff we work with or push the limit on how many patients can be treated and recover safely.

The cleft lip and palate surgery model is ideal for a charity mission. Most patients are healthy (we screen them well the first day and refer those who require workup), the surgery is not major (blood is not required and patients can breathe spontaneously while asleep) and the results are immediate, permanent and dramatically change the life of the patient and the family. We operate for 7 or 8 days out of 9 or 10, saving the last day or so to see that the last

patients are recovering well before we leave.

Parents are so appreciative and cannot express in English how they feel, but the universal signs in the eyes of a mother are unforgettable. This year at a new hospital in a different province, the administrators arranged a forum at the end of the mission where parent representatives — one mother and one father — addressed the group through a translator and told us how they felt about the treatment their children had received. It was very touching and, I know it's a cliché, but it really does make it all worthwhile!

Every year, we cannot wait to get back there. The rewards of helping these people go beyond the tangible things that we look for back home. We are very lucky to be able to do these missions — both from a time and cost perspective. We pay our own way entirely and, although food and accommodations in Vietnam are not expensive, the travel to get there is. I can now appreciate why we Canadians volunteer our time in less fortunate parts of the world, plying the trade that we have become experts in. It's the good feeling you get from helping others. It's part of the same reward we get when we take pride in the daily work we do for our patients at home and know they appreciate our efforts. It brings us back to the reason we all joined this great profession in the first place.

The PGA golf announcers refer to Mike Weir as being “so nice and polite because he's Canadian.” Maybe we're all just nice and want to do something for our fellow people! Well, for all those who do charity work for others, thank you for giving Canadian dentistry a good name and for serving your country and serving others in need. ✦

*Dr. Archie Morrison
President, CAOMS*

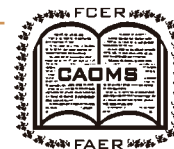


A young girl, 2 days after cleft lip repair, poses with her Canadian souvenir.



Dr. William L. Frydman

Message from the Foundation for Continuing Education and Research (CAOMS)



Mission

To contribute to the public welfare by advancement of the specialty of oral and maxillofacial surgery through research, education and the diffusion of knowledge.

History

The Foundation for Continuing Education and Research (CAOMS) was originally chartered on November 24, 1988, as an affiliate of the Canadian Association of Oral and Maxillofacial Surgeons (CAOMS). It is a registered charitable organization that is dedicated to securing the future of the specialty and the welfare of the public through the facilitation of appropriate, scientifically validated treatment modalities. The Foundation is managed in accordance with its constitution and bylaws by a voluntary Board consisting of a chair, vice-chair, past-chair, secretary treasurer and 3 trustees.

To date, the Foundation has provided funding and guidance for many Canadian institutions. The areas of research that are currently supported include oral cancer, infection control/bacteriology, distraction osteogenesis, bone physiology, anesthesiology, sleep apnea, orthognathic surgery, facial pain, temporomandibular disorders, Botox and nerve physiology. All the academic institutions with graduate studies in oral and maxillofacial surgery have received awards or grants from the Foundation.

The vital benefits that research provides for our profession and patients include:

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Use of Autogenous Bone Graft from the Iliac Crest to Restore an Atrophic Maxilla with Implant-Retained Prosthesis

Jack G. Zosky, DDS, FRCD(C), FICD



The "Clinical Showcase" section features step-by-step case demonstrations of clinical problems encountered in dental practice. This month's article is by Dr. Jack G. Zosky, a member of the Canadian Association of Oral and Maxillofacial Surgeons.

In patients with early loss of teeth and protracted denture wear, the residual bony ridge undergoes atrophic changes. This resorption is exacerbated when natural teeth are still present in the opposing arch. The excessive force from the natural dentition causes severe bone loss, producing a so-called "combination syndrome." As a result, the removable prosthesis becomes nonretentive and unstable. In addition, masticatory capacity is diminished, taste buds are negatively affected, speech patterns are altered and pain can ensue through the development of a sharp crest on the ridge. As well, loss of vertical dimension produces an aged appearance.

Fortunately, it is possible to reconstitute the lost structure with surgical grafting techniques. Once the hard-tissue and soft-tissue volumes have been restored, dental implants can be placed, which in turn are used to retain and stabilize a palateless overdenture prosthesis or a fixed ceramic restoration.

The case presented here demonstrates the harvesting of a corticocancellous block bone graft from the anterior iliac crest along with particulate marrow bone. A 63-year-old woman had been edentulous in the maxilla (except for teeth 17 and 27) for over 30 years and had worn a maxillary denture since loss of the maxillary teeth. Extreme atrophy had caused loss of vertical dimension and a pseudo-Class III appearance. The patient was extremely unhappy with the appearance and function of the denture (Figs. 1 and 2). The severely atrophic maxillary ridge was augmented with the block bone in the anterior region, and the particulate bone was used to vertically augment the sub-antral regions following bilateral elevation

of the sinus floor (Figs. 3 to 11). After 5 months for graft consolidation, 8 maxillary endosteal dental implants were placed (Figs. 12 to 16), and ultimately a fixed ceramometal prosthesis was fabricated (Figs. 17 to 21).

After completion of the maxillary treatment, the failing fixed partial denture for the left posterior mandible was replaced with implant-retained posts and crowns, the cantilever pontic in the 46 position was sectioned off, and an implant was placed and restored to give the patient first molar occlusion bilaterally with a level occlusal plane (Fig. 22).



Figure 1: Profile of 63-year-old woman after 30 years of maxillary denture wear. The extreme atrophy has caused loss of vertical dimension and the pseudo-Class III appearance.

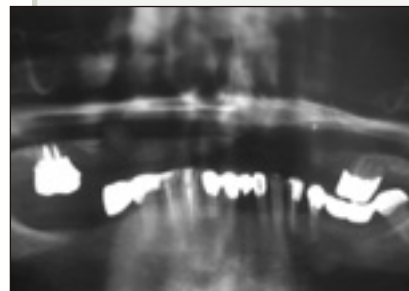


Figure 2: Panorex radiograph shows minimal maxillary alveolar bone with pneumatization of the antra and periodontally hopeless teeth 17 and 27. Note the natural mandibular dentition.



Figure 3: Harvesting of corticocancellous block bone graft from anterior iliac crest.

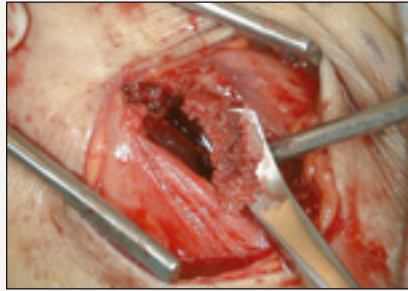


Figure 4: Harvesting of particulate marrow bone.

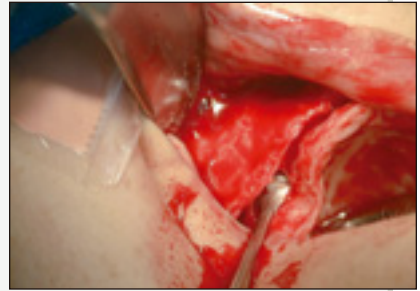


Figure 5: Full-thickness mucoperiosteal flap is raised, exposing the extremely atrophic maxillary ridge. Note the sharp crest.



Figure 6: Lateral bony window and elevation of schneiderian membrane of the maxillary antrum.



Figure 7: Donor block bone secured to maxillary recipient sites with fixation lag screws for onlay augmentation.



Figure 8: Advancement of soft-tissue flaps to achieve complete coverage of grafted areas. Note new volume of ridge form that has been created.

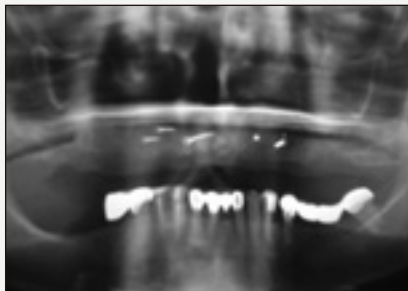


Figure 9: Panorex radiograph shows bone graft with fixation screws in anterior maxilla plus bilateral subantral vertical augmentations in posterior maxilla.



Figure 10: Ten days after graft surgery, the patient's existing denture, which has not been worn in the interim, is adjusted by cutting away the flange and creating a pontic-designed prosthesis.



Figure 11: Prosthesis in place with Visco-gel (Dentsply DeTrey GmbH, Konstanz, Germany) soft liner adapted to the intaglio surface of the prosthesis.



Figure 12: After 5 months of healing, the augmented maxilla is ready for placement of implants. In this image, the fixation screws are being removed. Observe the confluence of the bone graft to the native recipient alveolus.



Figure 13: A surgical template based on a diagnostic wax-up of the final prosthesis is being used to position and align the implants in the ideal relationship.



Figure 14: Implants (Nobel Biocare Replace Select, Nobel Biocare, Yorba Linda, Calif.) being placed and positioned parallel to the guide pins.

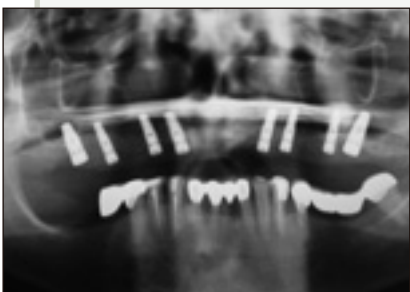


Figure 15: Panorax radiograph of 8 maxillary implants well spaced around the arch.



Figure 16: The implants at second-stage surgical uncovering, with healing abutments in place.



Figure 17: Frontal view of the final fixed ceramometal prosthesis after 2 years in function.



Figure 18: Right profile view of prosthesis.



Figure 19: Left profile view of prosthesis.

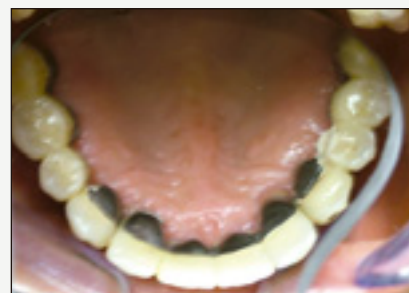


Figure 20: Occlusal view of prosthesis.



Figure 21: Patient in full smile.



Figure 22: Panorax radiograph of the patient's mouth after 2 years in function. Note the implant-assisted mandibular reconstruction.

Summary of Planning Considerations for Implant Treatment of the Edentulous Maxilla

1. Patient's objective, such as a simple desire for better retention and stability of a removable prosthesis or a preference for a fully fixed prosthesis.
2. Patient's general health.
3. Evaluation of quality and quantity of available bone.
4. Esthetic demands dictated by lip support, smile line, and other factors.
5. Patient consent regarding potential morbidity associated with graft harvest sites.
6. Financial capabilities.

Conclusions

This comprehensive surgical and prosthetic rehabilitation is complex and exacting but with insightful cooperation between surgeon, restorative dentist and laboratory technician, the patient's quality of life can be greatly enhanced. Many long-term edentulous patients suffer from masticatory deficiency, mucosal hypertrophy with epulides, inflammatory palatal mucositis, halitosis, nutritional concerns and low self-esteem with emotional and psychological overtones. An implant-borne fixed prosthesis can eliminate most if not all of these problems. ♦

THE AUTHOR

Acknowledgement: The author wishes to acknowledge the fine prosthetic rehabilitation performed by Dr. Tudor Dabuleanu.



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Dr. Zosky is a clinical consultant for Nobel Biocare and teaches continuing education courses for the company.

Further Reading

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PHILIPS

The “Point of Care” section 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. 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

How can I tell if a patient has obstructive sleep apnea?

Background

Much is now known about obstructive sleep apnea syndrome (OSAS),¹ to the extent that it is almost a household term in some communities. The media are aware of this condition, and family doctors are recognizing the symptoms with more regularity. The dental industry has climbed on board by promoting the fabrication of mandibular advancement appliances to control snoring, and some authors have suggested that these can help with obstructive sleep apnea.² However, care is required in their application.

Obstructive sleep apnea is defined as sleep-disordered breathing that results in relaxation of the soft tissues surrounding the airway such that the airway is occluded or partly occluded during sleep. It is diagnosed on the basis of polysomnography or a “sleep study” performed in a sleep laboratory to determine the number of apneic and hypopneic events during sleep. Apnea is the cessation of breathing for 10 seconds or more in the presence of respiratory effort, and hypopnea is a reduction in airflow for 10 seconds with evidence of an arousal and/or decrease in oxygen saturation by more than 3%. The total number of apneic and hypopneic events is divided by the total number of hours of sleep to give an index referred to as the apnea/hypopnea index or AHI.

As the person’s airway becomes partially or fully obstructed

and the level of blood oxygen drops, blood pressure and heart rate fluctuate and sleep is disturbed. These fluctuations in physiologic parameters can be likened to stepping on the gas and then slamming on the brake repeatedly while driving a car. Because of the arousals, the person may not reach the necessary stages of deeper sleep. Usually the individual is unaware of the arousals, but may notice the short-term effects, including tiredness during the day, not feeling refreshed after a night’s sleep, morning headaches and daytime somnolence. The long-term effects can be dangerous to the cardiovascular system, and pulmonary hypertension and heart failure may develop later.

Recognition of OSAS

The most common symptom reported by patients with OSAS is loud snoring; often it is the person’s bed partner who notices and reports (either to the person or to his or her physician) the



Figure 1a: Preoperative cephalogram of patient with severe obstructive sleep apnea. Note the restricted posterior airway space (arrows).



Figure 1b: Postoperative cephalogram showing a positive change in size of the posterior airway space (arrows) after maxillo-mandibular advancement surgery. The patient is now free of apnea and no longer dependent on continuous positive airway pressure.

relentless snoring and pauses in breathing throughout the night. The partner may repeatedly elbow the snorer in the ribs to start his or her breathing during these “pauses.” In some instances, the snoring is so bad that the snorer is relegated to a spare bedroom or even a distant room in the house so as not to disturb the rest of the family. The typical person with OSAS is a middle-aged, overweight male, but not all patients have this stereotypical appearance, and younger, average-sized women may also suffer from OSAS. These people can be so affected by daytime fatigue that they fall asleep “at the drop of a hat,” which can be deadly if it occurs while driving.

A questionnaire like the Epworth Sleepiness Scale⁴ or overnight pulse oximetry can help to screen patients for OSAS, but only a full polysomnogram is diagnostic. A dentist might suspect OSAS if a patient exhibits the following symptoms: loud disruptive snoring, reported pauses in breathing during sleep, morning headaches, daytime somnolence and impaired cognitive function due to lack of feeling refreshed on waking in the mornings. Lateral cephalometric radiography, which allows assessment of the posterior pharyngeal airway space, can be a useful diagnostic tool (Fig. 1),³ since many of these patients exhibit an anatomic abnormality.

Conclusions

OSAS is an increasingly prevalent problem in our society with serious immediate and long-term health consequences. If a patient asks a dentist for an appliance to help in management of a severe snoring problem, the dentist should consider OSAS and refer the patient to a sleep specialist for assessment. ♦

THE AUTHOR



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Dr. Morrison is a member of the Canadian Association of Oral and Maxillofacial Surgeons.

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QUESTION 2

What are the roles of surgery, radiation therapy and chemotherapy in the treatment of oral cancer?

Background

In Canada there are approximately 3,200 new cases of oral cancer and 1,100 deaths related to the disease per year.¹ Over 90% of oral cancers are squamous cell carcinomas. With the exception of lower lip cancer, which is related to sun exposure, tobacco and alcohol use remain the major risk factors for oral cancer in the Western world.

Patients with oral cancer may be asymptomatic or they may report pain, paresthesia, dysphagia, odynophagia, dysarthria, tooth mobility, neck mass and/or weight loss. Squamous cell carcinoma of the oral cavity may appear as a white lesion, a red lesion, an ulcer or a mass. Locations most frequently involved include the lower lip, the lateral and ventral surfaces of the tongue, and the floor of the mouth. Once a diagnosis of oral cancer has been established based on a tissue biopsy and histopathologic evaluation, a complete workup is required, including a thorough head and neck examination, computed tomography or magnetic resonance imaging, chest x-ray and blood work.

The patient's cancer is then staged according to the TNM (tumour, node, metastasis) classification (Tables 1 and 2).² Each case is then presented individually to a multidisciplinary head and neck tumour board, generally at a hospital-based regional cancer centre. Members of the board include otolaryngologists, oral and maxillofacial surgeons, radiation oncologists, medical oncologists, pathologists, radiologists, maxillofacial prosthodontists, speech pathologists, dieticians and social workers. The board provides a consensus opinion regarding treatment. Currently available therapeutic modalities for oral cancer include surgery, radiation therapy and chemotherapy.

Considerations in the Choice of Treatment

The goal of oral cancer treatment is to cure the disease while minimizing the sequelae of treatment and preserving or restoring form and function. Factors affecting the choice of treatment include the site and size of the primary lesion, the presence of metastasis and the general health of the patient.

Smaller (T1 and T2) oral tumours are equally amenable to surgery and radiation therapy; however, the long-term sequelae and potential complications of radiation, such as xerostomia, radiation-induced caries and osteoradionecrosis,

Table 1 TNM classification for oral cancer according to the American Joint Committee on Cancer²

Primary tumour (T)	
TX	Primary tumour cannot be assessed
T0	No evidence of primary tumour
Tis	Carcinoma in situ
T1	Tumour ≤ 2 cm in greatest dimension
T2	Tumour > 2 cm but ≤ 4 cm in greatest dimension
T3	Tumour > 4 cm in greatest dimension
T4	Tumour invades adjacent structures
Regional lymph nodes (N)	
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in a single ipsilateral lymph node ≤ 3 cm in greatest dimension
N2a	Metastasis in a single ipsilateral lymph node > 3 cm but ≤ 6 cm in greatest dimension
N2b	Metastasis in multiple ipsilateral lymph nodes ≤ 6 cm in greatest dimension
N2c	Metastasis in bilateral or contralateral lymph nodes ≤ 6 cm in greatest dimension
N3	Metastasis in a lymph node > 6 cm in greatest dimension
Distant metastasis (M)	
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

must be considered when contemplating radiation therapy, especially if the lesion is close to bone. As a result, surgery remains the primary mode of therapy for most oral carcinomas. Early-stage lesions are often treated with surgery alone, whereas treatment of late-stage lesions also frequently includes postoperative radiation therapy or concurrent postoperative chemotherapy and radiation therapy.

The 3 aspects of surgical treatment are resection of the primary tumour, management of cervical metastasis and reconstruction of the ablative defect. With squamous cell carcinoma, the aim of resection of the primary lesion is to obtain a 1-cm margin of normal tissue. Reconstruction options include simply allowing the defect to granulate in;

Table 2 Oral cancer stage groupings according to the American Joint Committee on Cancer²

Stage	Primary tumour	Regional lymph nodes	Distant metastasis
0	Tis	N0	M0
I	T1	N0	M0
II	T2	N0	M0
III	T3	N0	M0
	T1	N1	M0
	T2	N1	M0
IVA	T3	N1	M0
	T4	N0	M0
	T4	N1	M0
	Any T	N2	M0
IVB	Any T	N3	M0
IVC	Any T	Any N	M1

primary closure; split-thickness skin grafting; local flaps; regional flaps; free flaps involving microsurgical techniques; delayed nonvascularized bone grafting; placement of osseointegrated implants; and maxillofacial prostheses.

If there is clinical and/or radiologic evidence of cervical metastasis, therapeutic neck dissection is performed to remove the lymphatics and lymph node chains from the levels of the neck that are at risk for metastasis. If the patient has no evidence of cervical metastasis yet the risk of occult metastasis is greater than 20%, elective neck dissection is performed to remove the lymphatics and lymph node chains from the levels of the neck most likely to harbour occult metastasis. Factors used to determine the risk of occult metastasis include the site and size of the primary lesion, depth of invasion, vascular or lymphatic invasion and cellular differentiation.

Squamous cell carcinomas of the palatine tonsil and base of the tongue are frequently treated with primary radiation therapy alone or concurrent chemotherapy and radiation therapy (in advanced disease). Indications for postoperative radiation therapy for carcinomas of the oral cavity include

larger (T3 or T4) lesions, high-grade histology (lesions that are poorly differentiated or undifferentiated as well as lesions with infiltrating rather than pushing borders), presence of perineural or vascular invasion, tumour at or close to the surgical resection margin, metastasis to 2 or more cervical nodes, or cervical metastasis with extracapsular spread. Patients receiving radiation therapy for oral cancer must undergo a thorough dental assessment followed by any necessary dental treatment to minimize the need for future extractions in the irradiated field. In addition, they should be educated about the risk of radiation caries and osteoradionecrosis, and daily fluoride therapy should be started.

Recent evidence has demonstrated improvement in local and regional disease control, as well as survival benefit, with concurrent postoperative chemotherapy and radiation therapy for advanced oral cancer (stage III and IV disease).^{3,4} This has become the standard of care for patients able to tolerate the toxicity associated with concurrent chemoradiation therapy. ♦

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QUESTION 3

Can an impacted mandibular third molar be removed in a way that prevents subsequent formation of a periodontal pocket behind the second molar?

Background

Pocket formation behind the second molar after surgical removal of an impacted mandibular third molar is an occasional postoperative complication that cannot always be prevented.¹⁻³ This complication might necessitate further surgical intervention to eliminate the pocket or to regenerate bone.^{4,5} Such interventions are fraught with difficulty and meet with limited success.⁴ We have encountered cases where we tried several methods to treat this complication, but ultimately, removal of the second molar was the only way to treat the deep periodontal pocket extending to the apex of the distal root. In certain cases, however, pocket formation can be prevented.

Applicable Cases

Some patients with impacted mandibular third molars (especially semi-impacted ones) may present with periodontal pockets at the initial examination (because of loss of distoproximal crestal bone of the second molar). Such patients often benefit from removal of the impacted tooth; in adolescent patients, the resultant bone formation might even lead to attachment gain.¹

There are cases, however, where a bone-impacted mandibular third molar may present with no periodontal pocket distal to the second molar, even though the crown of the impacted tooth is in close contact with the distal root of the second molar and there is no radiographic evi-

dence of distoproximal bone below the alveolar crest and behind the second molar. This is because the alveolar crestal bone overlying the impaction is intact (Figs. 1 and 2). In such cases, removal of this overlying alveolar crestal bone to remove the impaction may cause a deep bone defect distal to the second molar extending down to the base of the extraction socket (Fig. 3). It is therefore prudent to preserve the bone overlying such impactions. However, an impacted third molar is usually removed through the alveolar crest (which predisposes to postsurgical pocket formation),^{5,6} and flap design makes no difference in this regard.⁶ Thus, in cases where a bone-impacted mandibular third molar with overlying crestal bone must be removed, we propose a lateral approach, as described below.

Surgical Technique

A full-thickness mucoperiosteal envelope flap is reflected and bone removal is started in the lateral cortex 2 to 3 mm below the bony crest using an electric surgical handpiece and a round surgical bur. An oval “window” of buccal bone is removed over the lateral aspect of the crown of the impacted wisdom tooth (Fig. 4). The anterior part of the buccal window should be no closer than 1 to 2 mm from the distal root of the second molar (to prevent iatrogenic root damage). After the crown and cervical part of the impacted tooth and the upper third of its roots have been exposed, the tooth is

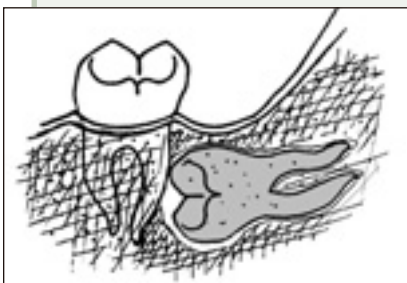


Figure 1: Bone-impacted mandibular third molar with no periodontal pocket distal to the second molar. The alveolar crestal bone overlying the impaction is intact.

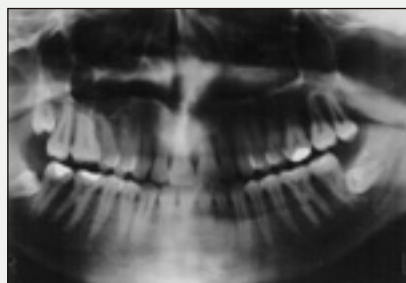


Figure 2: Orthopantomogram of horizontal bone-impacted left mandibular third molar in contact with the distal root of the second molar and not separated by a distoproximal bony septum.

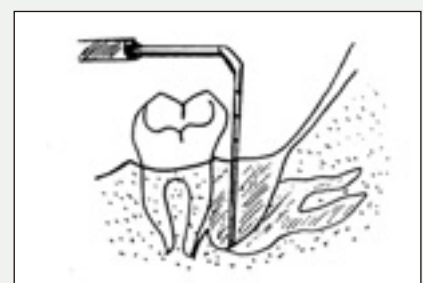


Figure 3: Postoperative bone defect distal to the second molar, which occurred after removal of the overlying alveolar crestal bone to take out the impacted tooth. The defect extends down to the base of the extraction socket.

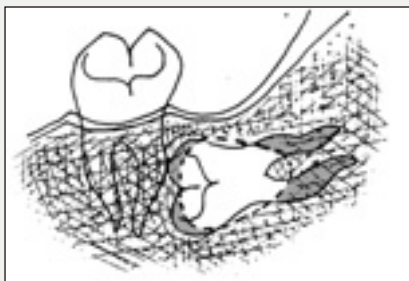


Figure 4: Removal of an oval window of buccal bone over the lateral aspect of the crown of the impacted wisdom tooth 2 to 3 mm below the crest and 1 to 2 mm behind the distal root of the second molar.



Figure 5: Intraoperative view shows the crown of the impacted wisdom tooth being delivered through the "buccal window."

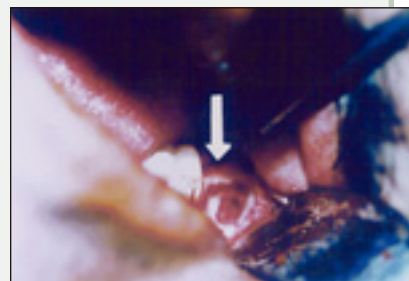


Figure 6: Intraoperative view shows the lateral bone defect (the "buccal window") and preservation of a rim of alveolar crestal bone superiorly and behind the second mandibular molar (arrow).

sectioned vertically at the cemento-enamel junction using a rose or fissure bur; the gap created in this way should be sufficient to accommodate the sectioned crown. However, to prevent damage to the lingual or the alveolar nerve, the tooth is not sectioned completely. A straight elevator is placed in the groove to separate the crown from its roots. The crown is then sectioned horizontally and delivered buccally (in pieces) using a hemostat (Fig. 5). Next, the roots are sectioned at the bifurcation and removed. After removal of the dental follicle, the flap is sutured in place.

Rationale

By preserving the alveolar crestal bone overlying the impaction, the buccal surgical defect created (the "buccal window") lies several millimetres below the preserved alveolar crest and behind the second mandibular molar (Fig. 6). Thus, a lateral (rather than vertical) bone defect is created, through which the tooth is delivered. After the flap is sutured in place, the defect is inaccessible. Therefore, regardless of bone formation, this type of defect prevents pocket formation even if a fibrous scar develops or epithelium migrates laterally into the defect. Wound dehiscence and lodging of debris is also prevented, as is damage to the lingual structures, because the flap is not extended or

reflected lingually. Case selection, however, is important to avoid risks and complications; as previously stated, this technique is applicable only to fully bone-impacted teeth, especially in the younger age groups. ♦

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QUESTION 4

A 25-year-old woman presents for treatment with a chipped front tooth and a black eye. Should I ask about domestic violence and, if it is occurring, what should I do?

Background

The statistics on intimate partner violence (IPV) are staggering. In Canada, 8% of women and 7% of men are victims of intimate partner abuse of some form, and 75% to 90% of Aboriginal women report abusive relationships. A third of blunt facial trauma in females is because of IPV.

Pregnancy is a particularly dangerous time for women living in abusive relationships. Up to 21% of women are assaulted during their pregnancy, and IPV is the leading cause of death in pregnancy for women. Because fewer than 20% of these women are likely to report the physical abuse, the practitioner must have a wary eye when blunt trauma is found in the female patient.

How to Help

First, identify the problem. Routine universal screening for IPV is gaining support throughout Canada. As there are significant personal, professional and social barriers to the disclosure, the only reasonable step is to screen all female patients with blunt facial injuries. In private, ask a general screening question: “Many patients have been hurt by one or more types of abuse. Have you ever experienced abuse as an adult?” Or a focused question: “Your facial injury suggests that someone has hit you. Is that what happened?” Be aware of the red flags for abuse (Box 1).

Box 1 Red flags of abuse

- Common physical injuries such as trauma to the head or face
- Explanation of injuries that does not fit the injury pattern or amount of force
- Multiple bruises in various stages of healing
- Delayed medical treatment for significant injuries
- Physical injury in pregnancy
- Chronic pain complaints
- Depression, suicidal ideation or post-traumatic stress disorder
- Alcohol or substance abuse
- Overly controlling partner not willing to leave woman alone with care provider

Second, ensure the safety of children involved in the relationship. Professional obligation to the children of your patients gives rise to one of the few instances when a situation must be reported regardless of the adults’ right to confidentiality. The Child and Family Services Act states that professionals must report any suspected child abuse or neglect to a children’s aid society (CAS). Witnessing violence is now deemed a form of emotional abuse or neglect, as research reveals the detrimental impact of growing up in an abusive

Box 2 Lethality checklist

The more items checked, the greater the danger. The perpetrator:

- Objectifies partner, believes partner is a personal possession (e.g., calls the partner names, body parts, animals)
- Blames the victim for abusive incidents
- Is obsessed with partner
- Is hostile, angry or furious
- Is extremely jealous and may suggest that partner is unfaithful
- Has been involved in previous incidents of significant violence with current partner or previous partners
- Has killed or injured pets
- Has made threats to kill or harm woman or children
- Has made previous suicide attempts or threatens suicide if partner leaves
- Has access to guns/weapons
- Uses alcohol or illicit drugs
- Has thoughts or desires of hurting partner
- Is recently separated or discussing separation or in process of divorce
- Has destroyed personal belongings of partner
- Has a diagnosed mental illness or may not be taking prescribed medications
- Police have previous involvement in domestic incidents

Box 3 Safety checklist during a crisis

- Call 911, yell loudly for help.
- Arrange for a friend or neighbour to call the police if they hear a disturbance coming from your home.
- Have a code word to use with children, family, friends or neighbours.

home. If you are unsure about a specific situation, call the CAS without giving any names and the CAS will tell you if reporting is required. If the situation does not meet the minimum requirement, then your obligation is to protect the privacy of the patient.

Third, help the patient get safe. This will mean different things to different patients. Ensure that the disclosure of IPV to you is handled in confidence and that staff are not likely to disclose the information elsewhere or by accident in the office. If the patient's partner is present, use the time when he has left the room to allow radiographs as an opportunity to ask questions and discuss the issue. Once a woman has left an abusive relationship, consideration and care must be given to any release of her personal information that may reveal where she is living.

After dealing with her current injury, ask your patient if she is safe to return home. A lethality checklist (**Box 2**) helps predict how dangerous an abusive partner might be. Document your clinical findings and ask whether your patient has an emergency plan — in case the partner's behaviour escalates. Safety checklists may help her plan for this event (**Box 3**). Give her telephone numbers for local women's shelters and crisis lines.

Each patient will have a different awareness of abuse. Let her know that you think she is being abused, tell her about available resources and, if necessary, help her get to a safe place such as an abused women's shelter. Ensure that all questions are asked and resources offered to the patient alone and in a discreet manner, so that the partner is unaware of the disclosure. Finally, not everyone is prepared to acknowledge the abuse; ask the questions and offer the help, but in the end it is the patient who will need to act. ♦

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

Further Reading

Centre for Research on Violence against Women and Children: www.crvawc.ca

Domestic violence handbook of the Oakland County Coordinating Council Against Domestic Violence: www.domesticviolence.org/safe.html

International domestic violence and abuse agencies list: www.hotpeachpages.net

Investigative Bureau Services of the Nashville Police (information on safety planning): www.police.nashville.org/bureaus/investigative/domestic/stalking.htm

Minnesota Center Against Violence and Abuse (large database of safety planning information and research on domestic violence): www.mincava.umn.edu

U.S. National Coalition Against Domestic Violence: www.ncadv.org



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- Newfoundland Fun Night

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Fractures of the Supraorbital Rim: Principles and Management

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ABSTRACT

Dentists may be asked to provide consultations for patients who have sustained trauma to their facial structures. Supraorbital rim fractures, although uncommon, must be recognized and promptly referred to an oral and maxillofacial surgeon or other specialist skilled in the management of facial bone fractures. Supraorbital rim fractures commonly coexist with other craniomaxillofacial injuries, especially with fractures of the anterior table of the frontal sinus. In this article, we review the frequency, management and complications associated with the treatment of supraorbital rim fractures in adults.

A series of 5 cases was reviewed; 4 of the 5 patients were male, with a mean age of 21.6 years (range 17–28 years). All injuries involved the supraorbital rim and the anterior table of the frontal sinus and occurred concurrently with other facial injuries. Treatment ranged from conservative observation to open reduction and internal fixation of the fractures. No associated perioperative or postoperative complications occurred. The follow-up ranged from 6 months to 26 years, with satisfactory subjective esthetic outcomes in all cases.

MeSH Key Words: fractures, bone/diagnosis; fractures, bone/surgery; orbit/injuries

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Fractures of the supraorbital region are rare and are frequently associated with high-energy craniomaxillofacial trauma. When displacement of the orbital roof occurs, exploration and precise reconstruction are warranted to limit such ocular complications as exophthalmos, enophthalmos, proptosis, diplopia, restricted ocular movement, altered vision, pain and discomfort.^{1–13} Fractures of the supraorbital rim can result in significant ophthalmologic and cosmetic morbidity (Fig. 1).

Isolated supraorbital rim fractures are rare.^{14,15} However, an estimated 1% to 9% of facial fractures can involve the supraorbital

rims and the anterior table of the frontal sinus, and many supraorbital rim fractures are associated with other forms of craniomaxillofacial injury.^{1–6,13} The degree of association has been reported to be 95% with fractures of the anterior table or wall of the frontal sinuses, 60% with the orbital rims, 60% with complex injuries of the naso-orbital-ethmoid region, 33% with other orbital wall fractures and 27% with Le Fort level fractures.¹ Many of these patients have multisystem injuries, most of which are neurologic.^{16,17}

Adults who sustain such fractures are generally between 20 and 40 years of age, and the vast majority are male.^{1,2,18} These fractures are



Figure 1: A 3-dimensional computed tomography (CT) image of patient with right supraorbital rim fracture.

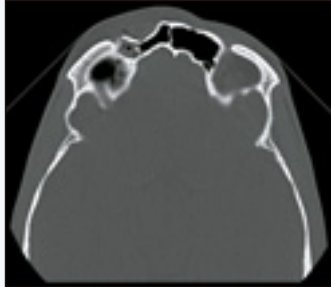


Figure 2a: Axial CT image of patient with right supraorbital rim fracture and concomitant fracture of the anterior table of the frontal sinus.



Figure 2b: Sagittal CT image of patient with right supraorbital rim fracture and concomitant fracture of the anterior table of the frontal sinus.

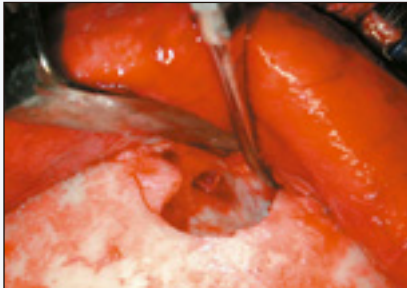


Figure 3: Fractures of the supraorbital rim and anterior table of the frontal sinus exposed through a coronal incision.



Figure 4: Fractures of the right supraorbital rim and anterior table of the frontal sinus fixed with titanium mesh and 1.0-mm fixation screws.



Figure 5: Postoperative Water's view of fracture reduction.

associated with high-energy impacts, motor vehicle collisions being the most frequently reported etiology.^{1,18} Many other causes have been identified, including tire explosions, ruptured garage door springs, chain saws, high-voltage electric shocks, swinging objects and falls from high places.^{1,3,9,10,18,19} Statistical information is unavailable for the frequency of nondisplaced, or isolated, orbital roof fractures, although a few case reports appear in the literature.^{6,11,13}

Patients with supraorbital rim fractures have characteristic physical signs and symptoms.^{1,2,12,18} If they are seen soon after the traumatic episode, then a cosmetic deformity consisting of depression or flattening of the supraorbital ridge can be visualized. Later these injuries may present with intensely turgid periorbital ecchymoses, edema, soft tissue lacerations and paresthesia over the area of distribution of the supraorbital and supratrochlear nerves. If the fracture is displaced, enophthalmos, exophthalmos and proptosis may be noted, along with

diplopia.¹² Ocular discomfort, epiphora, limitation of eye movement, increased scleral show and increased width of the palpebral fissure have all been reported.¹²

A review of the literature reveals no uniform system for the classification of supraorbital rim fractures; most authors rely on descriptive terminology.

A nondisplaced supraorbital rim fracture generally requires no surgical intervention.^{20,21} Treatment of concomitant neurologic or soft tissue injuries may be the only management needed. An orbital roof fracture, with undisplaced supraorbital rim involvement and no frontal sinus fracture, is common in children.²² When the fractured segments are displaced, surgical exploration, reduction and stabilization are indicated. Supraorbital rim fractures frequently involve the frontal sinus. If the anterior table of the frontal sinus and the supraorbital rim are displaced, then operative treatment is required^{14,15} (Figs. 2a and 2b).

A computed tomography (CT) scan can rule out damage to the posterior table of the frontal sinus. If there

Table 1 Demographics and perioperative summary of a series of patients with frontal sinus and supraorbital rim fracture

Patient	Sex	Age (years)	Location of fractures	MOI	Associated injuries	Surgical approach	Hospital stay (days)	Follow-up
AD	F	18	Right SOR + AT	Bicycle fall	Multiple facial lacerations	ORIF via forehead laceration + frontal sinus drain	3	26 years
JK	M	22	Bilateral SOR + AT	Motorcycle accident	Open nasal fracture	ORIF via nasofrontal laceration + frontal sinus drain	3	25 years and 10 months
JL	M	23	Right SOR + AT	Baseball	Proptosis of right globe	ORIF via coronal flap	2	8 months
KF	M	28	Right SOR + AT	Skateboard fall	None	ORIF via coronal flap	2	6 months
LC	M	17	Right SOR + AT + PT	Bicycle fall	SD + right OF/IOR	None	2	6 months

AT/PT = anterior table/posterior table of frontal sinus; IOR = infraorbital rim; MOI = mechanism of injury; OF = orbital floor; ORIF = open reduction internal fixation; SD = subdural hematoma; SOR = supraorbital rim.

is a displaced fracture of the posterior table, then a dural tear is quite possible. However, treatment of such an injury is beyond the scope of this article and must be carried out with a neurosurgeon on the team. If the involvement of the fracture is limited to the anterior table of the frontal sinus, then an assessment of the frontonasal duct is important to assure continued drainage of the frontal sinus after fracture reduction. The patency of the frontonasal duct is important to help prevent the formation of a mucocoele of the frontal sinus, which could result in the formation of a mucopyocoele, a delayed but serious infectious complication.^{22,23} These patients, therefore, require long-term follow-up. In patients who are at high risk of not returning for follow-up evaluation, cranialization of the frontal sinus with complete removal of all mucosal elements may be necessary to eliminate the risk of later mucocoele formation.^{10–13,24,25}

The need for fixation in supraorbital rim fractures depends on the type of fracture encountered. The reduction is often stable once the fragments have been levered into position because of the absence of muscular displacing forces¹⁴ (Fig. 3). Treatment involving the orbital skeleton has evolved considerably in the past century. Closed reduction, external fixators, antral packing and Kirschner wires were all used until open reduction with internal wire fixation was introduced in the 1940s

and became widely adopted by the 1950s.²⁴ The introduction of rigid fixation into craniomaxillofacial fracture management revolutionized the treatment of orbital injuries²⁵ (Figs. 4 and 5).

Patients and Methods

The records of patients treated by the members of the division of oral and maxillofacial surgery between January 1980 and December 2005 were reviewed retrospectively. Those with injuries not involving the orbit were excluded from this analysis.

Results

A total of 5 patients — 4 males and 1 female — with supraorbital involvement are reviewed in this report (Table 1). The mean age at presentation was 21.6 years, with a range of 17–28 years. Two patients fell from bicycles, 1 from a skateboard, another from a motorcycle and 1 patient was struck in the orbit by a baseball. Most injuries involved the right side, although one patient had bilateral fractures. Approaching the supraorbital rim and frontal sinus by a coronal scalp flap, using an incision well above the hairline, or through a pre-existing facial laceration offered wide access with minimal surgical morbidity and satisfactory cosmetic results.

Discussion

This series of patients supports previous observations that this fracture is more common in males than females.^{1,2,18} The fractures in this series seemed to occur as a result of localized trauma and involved the anterior table of the frontal sinus in every case.

The treatment of supraorbital rim fractures is indicated for functional and esthetic reasons.^{14,15} These fractures often require open reduction, as in the case of 4 of the 5 patients in this study. The results of treatment in all 5 patients in this series were satisfactory. No frontal sinus mucocoeles have occurred in these patients to date; however, long-term follow-up is necessary. ❖

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In-Office Iliac Crest Bone Harvesting for Peri-Implant Jaw Reconstruction

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ABSTRACT

We describe 2 minimally invasive techniques for in-office iliac crest bone harvesting. The increasingly limited access to hospital operating rooms and the increased need for bone grafting to facilitate dental implant-related reconstructions have been the major impetuses behind relocating some of these surgeries to the out-of-hospital, in-office setting.

MeSH Key Words: bone transplantation/methods; jaw/surgery; oral surgical procedures/methods

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Dental implant treatment has become widely accepted by patients, resulting in an increased demand for bone reconstructive techniques that allow for ideal placement of implant fixtures. Successful implant surgery is not simply the achievement of successful osseointegration, but rather the establishment of an ideal foundation for implant-supported prosthetic restorations. This objective requires the diagnosis and surgical management of deficiencies in both hard and soft tissue foundations. Some ridge-preservation techniques are expensive for the patient, are performed in sites that are often chronically inflamed and do not necessarily obviate the need for future osseous reconstruction. Autologous bone graft remains the gold standard approach for all forms of maxillofacial peri-implant reconstruction.¹ It is preferable to perform these procedures secondary to extracting teeth, allowing for soft tissue healing to optimize conditions for bone-graft coverage and consolidation.

The reconstruction of small osseous defects may be possible using autogenous bone

harvested from intraoral sources.² The mandibular ramus and symphysis provide small amounts of cortical and cancellous bone, suitable for single-tooth segments. However, harvesting bone from these sites carries a risk of paresthesia in the distribution of the inferior alveolar, mental and incisive nerves.² Thus, restoring large hard-tissue defects to facilitate implant placement usually requires the harvesting of bone from extraoral sites.³ The anterior ilium is easily accessible and provides large quantities of bone. It is well suited as a donor site for many types of reconstructive surgery.⁴ Although bone harvest surgery has traditionally been performed in hospital, recent advances in minimally invasive surgical techniques⁵⁻⁷ have allowed this procedure to be performed safely in the oral and maxillofacial surgery office on a routine basis. These techniques allow the surgeon to perform unilateral or bilateral maxillary sinus augmentation, buccal onlay grafting, cleft alveolar repair and revisional peri-implant grafting with significant amounts of autogenous bone.



Figure 1: A Straumann Osteocore (Straumann AG, Waldenburg, Switzerland) motorized trephine is introduced to the anterior iliac crest, with guiding trocar retractor protecting the surrounding soft tissues.

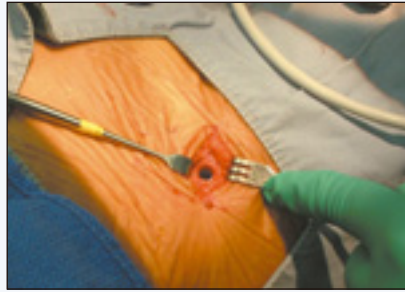


Figure 2: Minimal defect in right anterior iliac crest following trephination of a cancellous core.

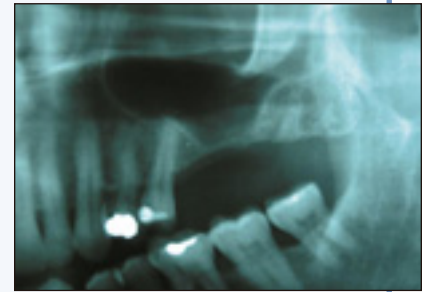


Figure 3: The left maxillary sinus before surgical elevation and autologous bone augmentation.



Figure 4: Postoperative view of left maxillary sinus immediately following sinus elevation and autologous bone augmentation using the Osteocore trephine technique.



Figure 5: Implant placement following 4-month period of graft incorporation.



Figure 6: Right anterior iliac crest with exposure of medial cortex before harvesting a block corticocancellous graft.



Figure 7: Block bone graft harvested from the iliac crest is rigidly fixed to the alveolar ridge with transosseous screws as an onlay graft to augment ridge width.

In-Office Bone Harvesting for Reconstructive Surgery

Bone harvesting from the anterior iliac crest originally involved hospital admission, as it was a far more invasive procedure than it is today. The development of less invasive harvesting techniques, limited access to hospital services for procedures deemed elective and increasing waiting times for procedures⁸ have resulted in more surgeries being performed in private clinics.^{9,10} The safety and complications associated with these techniques have been recently documented.¹¹

As in all clinical procedures, case selection is paramount; not every case is suitable for treatment in the office setting. Patients undergo a preoperative medical assessment that includes complete blood count, platelet count, international normalized ratio and electrocardiogram studies. Patients are assigned a classification according to the American Society of Anesthesiologists' (ASA) system.¹² ASA I and II patients are considered for in-office surgery, which can be performed using 1 of the following 2 techniques.

Harvesting Iliac Crest Bone by Trephination

Trephination, using a variety of approaches and instruments, has been reported to be a generally safe surgical technique and has been used with minimal morbidity in harvesting bone from the anterior ilium.^{5-7,13-22} The use of a power-driven trephine for this purpose has also been established as a safe technique to provide ample bone for many maxillofacial reconstructive procedures, including maxillary sinus elevation and cleft alveolar osseous reconstruction, with minimal morbidity.^{5,7,23}

Surgery is performed under intubated general anesthesia provided by an anesthesiologist. This allows the operating surgeon to concentrate on maintaining strict sterility of the surgical site, unencumbered by the

necessity of maintaining the patient's airway or administering anesthetic.

Long-acting local anesthetic consisting of 0.5% bupivacaine with epinephrine (1:200 000) is administered to the iliac crest site to ensure postoperative comfort. The incision, which ranges in length from 1 to 2 cm, depending on the amount of bone required, is made 1 cm posterior to the anterior superior iliac spine (ASIS) and 1 cm lateral to the height of the crest. Dissection is performed through Scarpa's fascia, avoiding both the iliopsoas and gluteal musculature. Following identification of the iliac crest, a mid-crest periosteal incision is made 1 cm posterior to the ASIS, and the bony crest is identified. A guiding trocar (Straumann AG, Waldenburg, Switzerland) is introduced onto the surface of the iliac crest, which then aids the surgeon in the placement of the trephine (Fig. 1).

Once the required number of cancellous bone cores have been obtained (Fig. 2), the edges of the bone are smoothed, the site is cleansed thoroughly with saline and Gelfoam (Pharmacia, Bergenfield, N.J.) is placed in the bony wound to control bleeding. The wound is closed in layers using a layered plastic surgical closure, with interrupted or continuous sutures, and dressed with a pressure dressing. Surgical drains are not required if dissection, wound closure and dressing procedures are performed appropriately.

Following harvesting of bone, attention is turned to the oral cavity, where grafting procedures are completed as required (Figs. 3 and 4). Local anesthesia is administered at the graft recipient site before incision, and the graft surgery, such as sinus floor elevation and augmentation, is performed using the autogenous bone graft. The patient is moved to the office recovery room and standard protocols for doctor and nursing supervision and criteria for discharge are followed. Jensen and Sennerby²⁴ have shown at a histologic level that implant placement can occur 4 to 6 months following bone grafting (Fig. 5).

Harvesting Block Bone from the Anterior Ilium

Although particulate cancellous bone has suitable handling properties for applications such as sinus augmentation and cleft alveolar reconstruction, block corticocancellous bone is ideal for reconstructing severe deficiencies in buccolingual ridge width. The use of segments of block bone allows for rigid fixation of the graft, which facilitates its undisturbed vascularization and subsequent incorporation. Harvesting of bone from the medial aspect of the anterior ilium has been demonstrated to have several advantages over lateral crest harvesting,²⁵ and this technique is preferred by the authors. The length of the iliac incision ranges from 2 to 6 cm, depending on the amount of bone required, and dissection to the iliac crest is identical to that described for the trephination technique.

Box 1 Possible complications from anterior iliac crest harvesting^{5-7,11,23}

- Postoperative pain at donor site
- Lateral femoral cutaneous nerve paresthesia or dysesthesia
- Hematoma
- Seroma
- Gait disturbance
- Contour deformity of donor site
- Infection
- Abdominal herniation
- Adynamic ileus
- Stress fracture
- Keloid scar

The medial aspect of the iliac crest is exposed and the medial soft tissues are protected throughout the remainder of surgery (Fig. 6). An osteotomy outlining the size of the required graft is performed at the iliac crest using a combination of saws, drills and chisels. Once the bony block has been obtained, the site is cleansed and Gelfoam (Pharmacia) is applied to the bony wounds of the iliac crest. The incision is closed and pressure dressings are applied as described in the trephination procedure. The intraoral recipient site is exposed, and the harvested piece of block bone is customized to fit the site passively. The corticocancellous bone graft is then fixed to the recipient site using 2.0-mm bone screws (Fig. 7). Cancellous bone is used to graft the gaps around the perimeter of the graft. The soft tissue flap is undermined and expanded to facilitate passive, tension-free closure over the graft. As with the trephined cancellous cores, implant placement can generally take place 4–6 months after graft surgery, at which time the bone fixation screws are removed (if nonresorbable metal screws were used) and the dental implants are placed.

Discussion

Several recent advances in minimally invasive bone-harvesting techniques^{26–28} have allowed a greater range of reconstructive surgeries to be performed in the ambulatory care setting. Motorized trephination for harvesting bone from the anterior ilium has been supported in the literature,^{5,7,23} and the safety of this technique has been documented as it has evolved over 7 years.^{6,7,11}

The technique described in this report was initially investigated in a cadaver study.²³ Once deemed to be anatomically safe, the procedure was then used in hospital until its safety record was established for ambulatory care.^{5,6,23} The technique was then further developed into

a routine outpatient procedure without the need for a postoperative hospital stay.⁷ More recently, the techniques described in this report were studied in 40 iliac crest bone-graft harvests performed entirely in the office setting.¹¹ Medial iliac crest block harvesting is also well established,^{4,25,29–31} and the complications associated with this procedure^{6,24,32–38} can be minimized by good surgical technique and proper case selection. As with any surgical procedure, there are possible complications (Box 1), many of which occur rarely. The 40 harvested sites resulted in complications limited to 2 seromas and 1 hematoma for an incidence of 7.5%. One patient sustained partial paresthesia in the distribution of the lateral femoral cutaneous nerve and 1 patient complained of hip pain and difficulty ambulating (2% incidence for each). None of these complications would have been prevented by hospital admission. All patients in that study were discharged directly home from the in-office setting as planned with no admissions to hospital.¹¹ Similar results have been obtained by harvesting bone from other extraoral sites such as the tibia.³⁹

Iliac crest harvesting in the office setting allows patients to receive a wide range of reconstructive procedures on a timely basis, expediting their reconstructive care. Surgery and anesthesia provided in the office setting are not covered by provincial health plans, and the financial responsibility for these procedures is assumed by the patient. At present, limited coverage for these procedures may be extended by private insurance carriers.

It is the responsibility of surgeons performing iliac crest graft surgery to ensure that they are adequately trained to perform such procedures in an out-of-hospital setting and to maintain the highest standards of safety and excellence so that the frontiers of hospital-based surgery are not being moved without due care and attention to the safety of the patient. Patients are generally very satisfied with the provision of their surgery in the office setting.¹¹ The advantages of performing iliac crest harvesting in the private practice setting include patient convenience, increased predictability in the scheduling of surgery and the prompt delivery of elective reconstructive care. ♦

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Soft Tissue Pediatric Facial Trauma: A Review

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ABSTRACT

Facial soft tissue injuries are common in pediatric trauma patients. Early diagnosis and definitive treatment as well as good postoperative wound care are important when dealing with soft tissue injuries, such as facial nerve and parotid injuries, animal bites, avulsive skin wounds and eyelid and ear lacerations. Children heal quickly, but they also tend to develop hypertrophic scars. Proper wound management during the healing period can help to minimize the risk of adverse scar formation. Dentists may be involved in the initial assessment of these patients. Knowledge of the diagnosis and management of soft tissue trauma is useful when dealing with pediatric patients and their parents postoperatively.

MeSH Key Words: child; facial injuries/etiology; facial injuries/surgery; surgical flaps

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Dentists may be involved in the primary assessment of pediatric trauma patients. Dentists acquire a keen eye for detail through continued training and practice and this, combined with their knowledge of facial anatomy, makes them ideally suited to the diagnosis and management of facial trauma. Although dentists may not be involved in all aspects of craniofacial soft tissue treatment, they form an important part of the management team. Dental professionals may be one of the key health care providers who assess the patient postoperatively and provide some aspect of orofacial reconstruction. To be an effective member of the trauma management team, dentists require a thorough knowledge of the diagnosis and treatment of soft tissue craniofacial injuries.

There has been a gradual rise in the incidence of trauma in children, probably due to increased risk-taking and aggressive behaviour in children, who are more commonly left to their own devices without close supervision. Injury is still the number one killer of children,

with a large proportion of the mortality related to head injury.¹

In this paper, we review soft tissue injuries, the role of prophylaxis and, antibiotic use, and the prevention and control of scarring.

Soft Tissue Injuries

Soft tissue injuries are more common than fractures in children who have sustained facial trauma, particularly in younger children whose facial skeletons are resistant to fracture.² During initial assessment of any facial injury, it is important to review the mechanism and time of injury and determine whether it was witnessed. Knowing what caused the injury will be valuable during later exploration and debridement of wounds and the prediction of subsequent wound healing. Every effort should be made to cleanse the wound and remove all foreign material; this may have to be done in the operating room under anesthesia. If there is an open wound, the tetanus status of the child should be assessed and appropriate management commenced early.³



Figure 1: Deep laceration to the cheek from a dog bite. Evidence of deep subcutaneous fat implies possible underlying injury to the facial nerve.



Figure 2: Pulse-vacuum irrigation of a contaminated scalp avulsion injury is used to dislodge foreign bodies and decrease the bacterial load of the tissues.

Several key elements of wound care are important in predicting the quality of healing in children:

- eliminate foreign body contamination and the resulting excessive inflammatory response
- keep sutures below the skin surface, if possible
- use supportive skin dressings, such as wound support tapes, during the first 6 weeks of wound repair
- protect wounds from subsequent injury, excessive drying, wetting or temperature variations
- engage parental participation in postoperative wound care, such as cleansing the wound of debris and scabs, applying dressings and massaging scars.

The wound healing response is generally more intense and accelerated in children, as they do not usually have compromising systemic disease or indulge in abusive habits such as alcohol or tobacco use. However, although children heal quickly and predictably, increased collagen deposition in wounds tends to cause hypertrophic scars. Soft tissue wounds that are clean or only mildly contaminated and with little tissue compromise can be cleansed and closed. Antibiotics are not usually indicated unless there is a question of host immune status. Wounds can be closed up to 24 hours after injury. Older wounds should be thoroughly cleansed and their margins freshened before closure. Vigilance for wound breakdown necessitates a

check 3 days after closure in the pediatric trauma patient. Blunt trauma may result in extensive and prolonged tissue damage with subsequent deep scarring and poor esthetics.

Nerve and Duct Injuries

Generally, wounds distal to a line drawn from the lateral canthal region to the mid-mandible will not require facial nerve exploration or repair. Wounds proximal to this line should be explored under magnification for possible nerve injury and the need for repair (Fig. 1).

Preoperative clinical assessment may reveal nerve injury and palsy. Injuries below the subcutaneous fat in the parotid region should be explored for parotid duct injury. A small catheter or a lacrimal probe inserted through Stensen's duct will reveal a proximal ductal injury in the wound bed.

All nerve and ductal injuries require micro-repair with permanent sutures. In addition, severed ducts should be stented for at least 2 weeks or until epithelial tissue continuity has been restored in the lumen.⁴ When ducts are stented, the patient should be prescribed antibiotics for 7–10 days, as the gland may become somewhat static and prone to obstructive sialadenitis. The use of chewing gum or sugar-free lozenges to stimulate saliva production may be considered.

Bites

Animal bites require confirmation of rabies status, thorough wound exploration and irrigation and prompt closure of the linear aspects of the wound. Puncture wounds should be irrigated to their depths, kept open and seen frequently to detect infection. All animal bites will result in intense but temporary (2–3 days) inflammation, which should subside.

Human bites are more problematic due to the presence of virulent and resistant organisms.^{3,5} Wounds should be thoroughly cleansed, then approximated, but not completely closed, if there is any concern over tissue viability. The infectious status (hepatitis, HIV, etc.) of the offending person must be ascertained and documented and appropriate management must be commenced.

Antibiotic prophylaxis is advisable for both animal and human bites. Amoxicillin–clavulanate is widely regarded as the gold standard in the treatment of animal and human bites.³ Antibiotic therapy in the penicillin-allergic patient is more controversial. Clindamycin combined with trimethoprim–sulfamethoxazole is an appropriate choice in children, and azithromycin may be an option in the pediatric penicillin-allergic patient.³

Avulsive Wounds

Avulsive wounds of the facial region result from high velocity recreational activities, such as bicycling, skateboarding, etc., or from motor vehicle accidents including those involving off-road vehicles. Under general anesthesia

in the operating room, wounds require careful exploration under magnification, debridement, pulse-vacuum irrigation with an antibiotic-containing solution (Fig. 2), conservative trimming of nonviable tissue margins and primary closure if possible. Avulsed or widely undermined soft tissue flaps require proper suction drainage to prevent hematoma formation and pressure or support dressings to allow both arterial inflow and venous outflow. Frequent checks of the wound to confirm tissue viability are important. If there is concern over viability, steps should be taken to optimize tissue vascularity through suture removal, improved tissue support or enhancement of wound drainage. Adjunctive measures such as hyperbaric oxygen treatment have been shown to be beneficial for marginally viable or hypoxic wounds.⁶

When loss of tissue is extensive, a staged approach to reconstruction is required. The initial effort is directed at cleansing and debriding the wound to prevent infection and further tissue loss. Serial wound debridements and numerous tissue dressing changes may be required in the first 2 weeks after injury. Vacuum-assisted drainage can be helpful to remove debris, reduce the circumference of wounds and stimulate the vascular bed in preparation for final repair. Large avulsive wounds, e.g., in the scalp, may require staged tissue expansion and local flap reconstruction (Fig. 3).

Special Wounds

Special wounds, such as those involving nasal and ear cartilage, require thorough cleansing and removal of any foreign bodies, then meticulous approximation of the cartilage and skin. Cartilage requires less oxygen than bone, but it still needs complete soft tissue coverage and support or bolster dressings (Fig. 4) to eliminate hematoma and seroma formation. Bolster dressings can generally be removed in 5–7 days. Cartilaginous disruption, particularly of the nasoseptal cartilaginous skeleton, is susceptible to growth disturbances.

Injuries to the eyelids require an initial ophthalmologic assessment and possibly dilation and slit lamp examination to rule out globe injury. Fluorescein staining will reveal corneal epithelial and lacrimal injuries. If the tear

ducts are injured, obstruction, stasis and infection may follow, so prompt and thorough evaluation is necessary. If a child will not tolerate lacrimal and canalicular evaluation, then a detailed examination in the operating room is indicated. Placement of silicone intubation tubes through the severed tear ducts will preserve the canalicular and lacrimal system. The eyelids are composed of anatomical layers called lamellae (anterior, middle and posterior), and each lamella must be repaired or supported to ensure proper eyelid function.

Surgical treatment of eyelid injuries is completed in the operating room under general anesthesia with the patient paralyzed to prevent unexpected movement. The tissue is irrigated thoroughly and loose flaps of skin are debrided (Fig. 5). A corneal shield is routinely used to prevent corneal abrasion, which can be a painful and irritating postoperative sequela (Fig. 6). Just as the vermillion border and white roll are the important landmarks

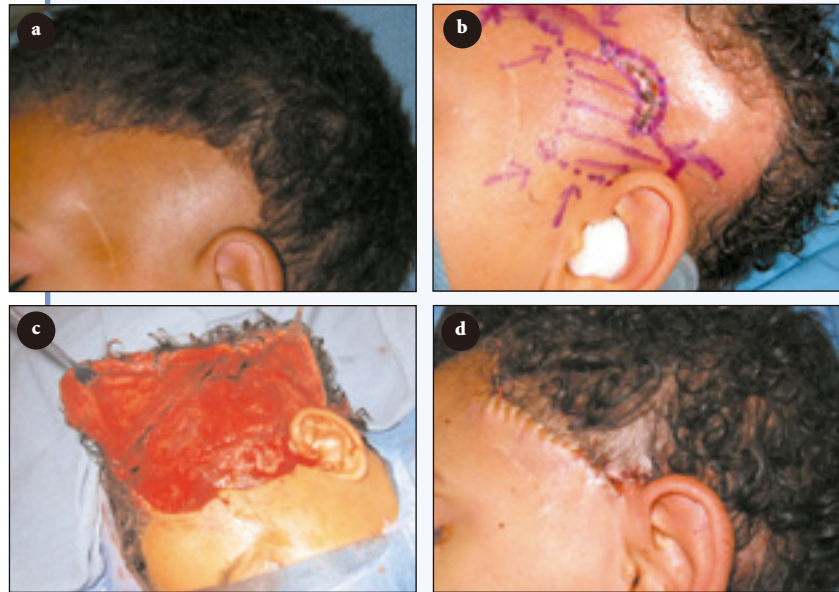


Figure 3: (a) A hair-bearing scalp avulsion defect addressed with a staged reconstruction using (b) tissue expansion, followed several weeks later by (c and d) second-stage scalp advancement.

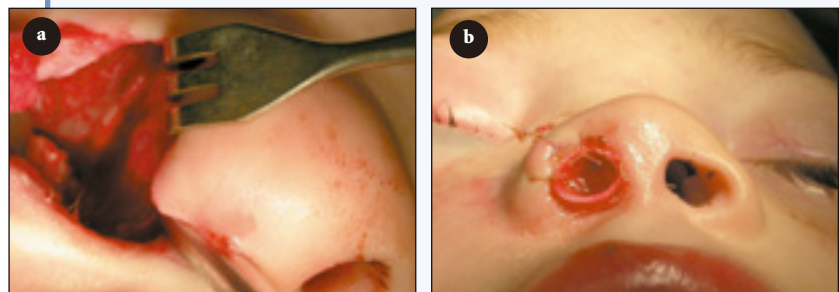


Figure 4: (a) Complex wound with avulsion of nasal cartilage. (b) Postoperative repair using supportive stent and bolster dressings, which will remain 5–7 days.



Figure 5: Avulsive eyelid injury.



Figure 6: Complex eyelid laceration with corneal shield in place.



Figure 7: Silicone pressure dressings on scars resulting from a dog bite. These dressings are soft, cleansable and well tolerated by children.

in lip repair, the gray line of the eyelid is the key to proper lid alignment. The tarsal plate, which is the supportive structure of the eyelids, must also be repaired. If the orbital septum has been violated, yellowish orbital fat will be seen protruding through the septum. Meticulous hemostasis is mandatory before closure of the septum to reduce the risk of retrobulbar hematoma, which may place excessive pressure on the globe and optic nerve and could potentially result in blindness. Some surgeons monitor the orbit for 24 hours in hospital and, although the treatment is controversial, place the patient on steroids to prevent increased intraorbital edema and pressure.⁷

Scar Management

Because children have a tendency to heal with scarring, it is important to guide the wound during active healing.⁸ All permanent sutures should be removed in 3–5 days and wound support dressings applied for 10–14 days to remove tension from the wound bed, which would increase collagen deposition. During this period, any irritating influences and encrustations should be removed from the wound and the area should be kept moist and covered. Topical antibiotic ointment should be discontinued after 7 days to prevent tissue reaction.

When the wound is well epithelialized, usually in 7–10 days, silicone sheeting or topical scar gels can be applied for several weeks (Fig. 7). These agents keep tension off the wound, as well as maintain slight pressure on it, to help reduce excessive collagen deposition into the scar. During this period, it is important to avoid excessive wetting, drying, heat or irritating agents that might exacerbate the inflammatory response. The patient should use sunblock with a high sun protection factor while outside and wear a wide-brimmed hat to cover the face, if possible, for up to a year after injury to avoid ultraviolet stimulation of melanocytes in the wound bed and subsequent hyperpigmentation.

Children with darker skin pigmentation may be prone to excessive scarring (keloids) and pigmentation changes.

If scarring appears to extend beyond the wound margins, a keloid scar may be forming. Topical hydrocortisone, injectable triamcinolone and even low-dose radiation may be helpful in reducing keloid scars. Finally, scars that are discoloured can be tattooed with permanent medical grade pigment to match the surrounding skin. Revision of scars should be deferred until final maturation is complete — approximately 6–12 months postinjury.

Conclusions

Pediatric facial injuries are common due to children's high level of physical activity, decreased supervision and tendency toward risk-taking behaviour. Dentists may be involved in the initial assessment of these patients and can refer them appropriately for definitive treatment. Repair of soft tissue wounds is a high priority — identifying and maintaining tissue viability is paramount, as is early diagnosis and repair of nerve and ductal integrity. Wound support and daily cleansing of wounds, as well as measures to decrease tension, help decrease scar formation. ✦

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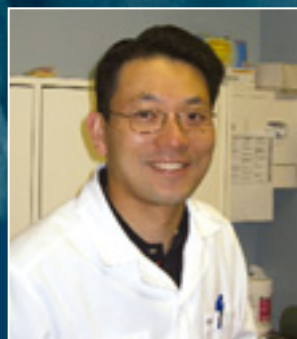
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Hard Tissue Pediatric Facial Trauma: A Review

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ABSTRACT

Although hard tissue injuries are uncommon in the pediatric patient, dentists may be involved in the initial assessment of these patients. In this paper, we review fractures of the facial skeleton with a focus on dentoalveolar injuries. Minimally displaced fractures in pediatric patients can be managed conservatively, while displaced fractures may require open approaches and rigid fixation. New fixation stratagems are presented, and possible facial growth disturbances resulting from trauma are discussed.

MeSH Key Words: child; facial bones/injuries; skull fractures/diagnosis; skull fractures/surgery

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Although uncommon in the pediatric patient, craniofacial fractures can occur in some of the millions of pediatric patients in Canada and the United States every year.¹ Dentists may be involved in the initial assessment of these patients and should be able to obtain a focused history and carry out a physical examination of the facial region. Dental professionals are often involved, as members of a comprehensive team, in the management of the facial trauma patient, especially those with fractures involving the mandible and maxilla with concomitant dental trauma. To be an effective member of the team, the dentist requires knowledge of the surgical procedures that may be needed.

Compared with soft tissue injuries, maxillofacial fractures are uncommon in patients under 5 years old; fewer than 1% of maxillofacial fractures occur in this age group.^{1,2} This is likely due to multiple factors, including the flexibility of the facial skeleton, the small size of the facial sinuses, the presence of multiple fat pads, unerupted teeth that may buttress the bone and a high level of adult supervision.³ Among adolescents, an increase in risk-taking behaviour and a reduction in parental supervision result

in an increase in the rate of facial fractures.¹ Still, the overall incidence of facial fractures in the pediatric population is less than 15% of all facial fractures.⁴

In this paper, we review fractures of the facial skeleton with a focus on dentoalveolar injuries. New fixation stratagems are presented, and possible facial growth disturbances resulting from trauma are discussed.

Diagnosis

Physical examination plays an important role in the diagnosis of fractures of the facial skeleton. Children are more difficult to examine than adults, both physically and radiographically; because a thorough examination is essential, sedation should be considered if necessary.

Orbital examination should include assessment of visual acuity, pupil size and response, visual fields, diplopia (double vision), fundi and extraocular muscle function. Subconjunctival hemorrhage (bleeding under the bulbar conjunctiva) and chemosis (bulbar conjunctival swelling) are common in patients with periorbital fractures. Care must be taken not to miss diagnosing hyphema (blood in the anterior chamber of the eye) due to the possible

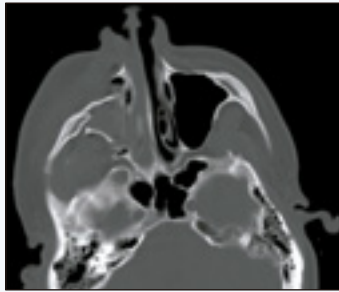


Figure 1: Posteriorly displaced zygoma fracture. Note the facial swelling on the affected side, which may mask the bony deformity beneath during visual inspection.



Figure 2: Facial laceration with comminuted nasal bone fracture sustained by an unrestrained passenger in a motor vehicle collision



Figure 3: Three-dimensional CT scan demonstrating reduction and fixation of a right zygoma fracture completed through multiple approaches.

long-term effects on vision. If there are any visual defects, consultation with an ophthalmologist is indicated. Palpation of the bony margins of the orbit for step deformities will indicate the point of fracture. Nasal examination should include an assessment of symmetry, dorsal deformity and intranasal obstruction.

The zygoma should be assessed for malar depression resulting in facial flatness on the affected side (Fig. 1). Paresthesia of the infraorbital nerve may result from bony impingement or direct nerve injury. Diplopia may occur as a result of swelling around the extraocular muscles or an increase in orbital volume with globe displacement. Posterior displacement (enophthalmos) or inferior displacement (hypophthalmos) of the globe, or both, can result from orbital floor disruption. Fractures of the zygomatic arch with consequent spasticity of the masseter muscle may cause trismus.

Examination of the maxilla and mandible involves assessment of occlusion and the dentition. Inspection of the occlusal plane for step deformities and of soft tissue for the presence of gingival tears as well as sublingual or vestibular ecchymosis can provide evidence of jaw fractures. It is important to locate missing teeth, as they may be present in orofacial wounds. A useful technique for obtaining a lateral view of the lips is to have the parent or child hold a periapical or occlusal film in place.

For imaging the mandible, panoramic radiography is a particularly valuable aid that provides good detail of all portions of the mandible, although supplementary perpendicular views may be needed to form an accurate diagnosis.

Modern computed tomography (CT) is the gold standard for viewing craniofacial fractures. CT images provide excellent detail of the cranium and mid-face structures and are also useful in imaging the mandibular condyle. Newer scanners provide a high level of detail in a short time and allow generation of 3-dimensional images, which are helpful in interpreting the patterns of complex fractures.

Treatment

Facial fractures can be managed by closed or open reduction. The type of fixation chosen depends on several factors: the age of the patient, the site of the fracture, the complexity of the injury and the approach that will be used to repair the fracture.^{1,2,5}

Mid-face Fractures

Orbital and frontal bone injuries are uncommon in children, although, after age 7, the increasing prominence of the frontal bone in combination with the thinness of the anterior table of the frontal sinus makes fractures of the frontal sinus more common.⁵ If the bones are displaced or extraocular muscle movement is restricted, an open approach, including consideration of a bicoronal flap to access the frontal bone, is recommended. Cosmetic incisions around and through the eyelids provide easy access to the fronto-orbital region. Patency of the nasofrontal ducts must be ensured if the frontal sinus is functional to prevent sinusitis or late mucocele formation.

Naso-orbito-ethmoid (NOE) fractures are among the most technically difficult fractures to correct. Consideration must be given to proper exposure and the use of resorbable fixation devices. The intercanthal distance (between the medial corner of each eye) must be re-established to prevent the development of traumatic telecanthus (widening of the canthi) postoperatively. Visual acuity and ocular mobility must be verified before the procedure and reconfirmed afterward.

Nasal injuries are among the most common injuries of the facial skeleton (Fig. 2). They can be difficult to assess in children due to edema and lack of cooperation during initial examination. Even when a closed approach is used, reduction of the nasal bones, alignment of the upper and lower cartilages and stabilization of the septum in the midline must be carried out with care. Septal hematomas must be evacuated with postoperative compression using septal splints to prevent recurrence of hematoma and subsequent growth disturbances.^{2,3}



Figure 4: Maxillomandibular wire fixation in a 13-year-old patient with a right mandibular body fracture fixed with a resorbable plate.



Figure 5: Preoperative (a) and postoperative (b) views of resorbable fixation of a left mandibular body fracture in an 8-year-old patient.

Maxillary fractures are not common in children unless the maxillary sinus is present.⁵ Closed reduction and maxillomandibular fixation for 2–3 weeks can be used to treat minimally displaced fractures. If open reduction is used, care must be taken to avoid damage to unerupted teeth from inappropriately placed screws.

Zygoma fractures are very rare in young children, but become more common as the zygoma becomes more prominent with growth.^{5,6} Observation is indicated for “greenstick” and minimally displaced fractures. An intraoral approach can be used to access and reduce displaced arch fractures. Often a zygomatic buttress plate can be applied intraorally to manage an inferiorly and posteriorly displaced zygoma, which is a common pattern of displacement in children. Multiple approaches may be used to ensure adequate fixation in grossly displaced fractures (Fig. 3).

Mandible Fractures

Simple mandible fractures that are non-displaced or minimally displaced can be treated by closed reduction or observation. Mandibular fixation with an Erich arch bar or wire and composite cement can be used in young children. These patients can also be observed and managed with conservative treatment, including a soft diet and limitation of function for a short time.

Depending on the age of the patient, compliance and severity of the fracture, maxillomandibular fixation may be needed to ensure a stable occlusion (Fig. 4). This procedure has the disadvantages of occasionally limiting the ability to achieve anatomic reduction and restricting full motion of the mandible. Before age 2 and after age 6 years, children have a partial or mixed dentition, which makes the application of arch bars more difficult. If a malocclusion exists, elastics can be used for 10–14 days to guide and stabilize the occlusion.

Fractures that are displaced, open or unfavourable for healing may require open reduction and fixation (Fig. 5). Internal fixation requires an open approach, which may have deleterious effects on future growth. The need for

added stability of the fracture must be balanced against the risk of soft tissue scarring and disturbance of the periosteum, which may restrict bone growth.¹

Condylar fractures in children are often amenable to conservative treatment, such as observation or closed reduction for a short period. If the patient is less than 5 years of age, the fracture will usually heal spontaneously, with little condylar remodelling. In 5–12 year olds, some bone remodelling occurs, but elastics may be required to allow mobility but help guide the occlusion. Children older than 12 years will have limited remodelling and will require elastics for 10–14 days followed by intense physiotherapy to regain mobility and function.⁷ Consideration may be given to open reduction and fixation of displaced condylar–ramal fractures in adolescents to restore vertical height. Careful observation and a soft diet are critical in the management of mandibular condyle fractures.

Dentoalveolar Injuries

Avulsed or fractured primary teeth can be discarded or removed and plans made for space maintenance, if appropriate. Most dentoalveolar fractures should be manually reduced and stabilized with splints, composite cement or wires. Large bony segments may be effectively reduced in this manner if teeth are present or small fixation plates may be applied if the teeth are fractured. Oral soft tissue wounds, which may occur in conjunction with facial fractures, should be closed with resorbable sutures (fast-gut, gut or chromic). Tongue wounds, unless gaping or bleeding, do not usually require sutures. If closure is necessary, a slower resorbing, deep suture should be placed in the muscular layer.

Rigid Fixation

Resorbable fixation plates are now commonly used in addition to titanium mini- and micro-plates in the treatment of pediatric fractures.⁵ The resorbable systems, which are made of copolymers of poly-L-lactic acid and polyglycolic acid, have varying strengths and rates of resorption but

most completely resorb by 1 year. Metallic fixation plates are still used due to their predictive nature and ease of handling.⁶ Either type of fixation device is well tolerated by children.

Growth Disturbances

Mid-face fractures can result in long-term skeletal deformities. NOE and severe nasal fractures can cause post-operative saddle-nose deformity or septal deviation.⁴ They may also inhibit mid-face growth due to the complex relation between the ethmoid, vomer, septum and maxilla, and their contribution to facial projection.

Mandibular condylar fractures usually heal well in children, and a return to normal mandibular function may be quite rapid. However, parents must be informed of the risk of long-term growth restriction, which is more common in this type of fracture, particularly in early childhood. This may result in late malocclusion with deviation to the affected side, which may not be detected until the permanent dentition erupts.⁷ Orthodontic treatment and surgery may be required to correct the occlusion once growth has been completed.

Conclusions

Fractures in children are less common than soft tissue injuries due to multiple factors. Young children are more apt to have greenstick fractures and require observation or minimal fixation measures. Older children with comminuted or displaced fractures frequently require open reduction and fixation. Mandible fractures usually require a brief period of immobilization followed by physical therapy to reduce ankylosis and loss of function. Growth disturbances often occur in the actively growing child who has sustained trauma to the nasal and condylar regions. ➤

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Nerve Injuries after Dental Injection: A Review of the Literature

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ABSTRACT

Prolonged and possibly permanent change in sensation due to nerve damage can occur after dental injections. Although the condition is rare, many practitioners will see this form of nerve injury during their careers. The exact mechanism of the injury has yet to be determined, and little can be done to prevent its occurrence. This type of injury carries with it many functional and psychological implications, and referral to both dental and medical specialists may be necessary for continued follow-up and possible treatment.

MeSH Key Words: anesthesia, dental/adverse effects; mandibular nerve/injuries; nerve block/adverse effects; sensation disorders/etiology

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A temporary reduction in sensations, notably nociception (pain), during dental procedures can drastically reduce anxiety in the dental workplace and decrease patients' negative experiences.¹ Yet regardless of how beneficial a health care procedure may be, there are always associated disadvantages and risks.² Incomplete anesthesia, hematoma formation, broken needles, trismus, infection, toxic reactions and allergic responses, including anaphylaxis, are all potential problems with dental injections.^{3,4} Another documented complication after injection of local anesthetic in the dental setting is prolonged and possibly permanent alteration of sensation over the areas supplied by the involved nerve(s).³⁻¹¹

Neural Anatomy

Each peripheral nerve fibre is surrounded by a basal lamina, collagen fibres and endoneurial capillaries, which together form the endoneurial connective tissue layer¹²⁻¹⁵

(Fig. 1). The nerve fibres are grouped into fascicles surrounded by a connective tissue layer called the perineurium. This perineurial layer helps to support, protect and sustain the individual nerve fibres.¹²⁻¹⁵ The outer layer, the epineurium, protects the underlying fascicles by resisting tensile and compressive forces. This layer is composed of connective tissue, lymphatic vessels and nutrient vessels (the vasa nervorum).¹⁶ A loose areolar connective tissue layer, the mesoneurium, surrounds the epineurium and provides the nerve with a segmental blood supply.¹²⁻¹⁵ If any of these extra-neural tissues are disrupted, a sensory disturbance may result because of interrupted neural transmission.¹⁵

Local anesthetics for use in dentistry are designed to prevent sensory impulses from being transmitted from specific intraoral and extraoral areas to the central nervous system, with minimal effect on muscular tone.¹ Nerve injuries after either supraperiosteal or proximal block injections can affect

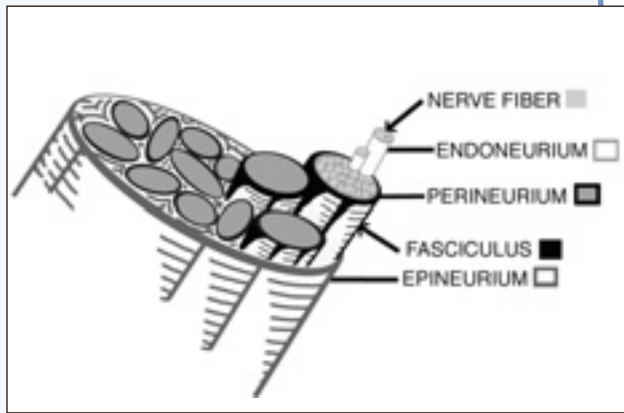


Figure 1: Diagram of peripheral nerve anatomy and individual connective tissue components.

mechanoreception (touch, pressure and position), thermoreception (hot and cold) and nociception (pain).^{8,15,17} In some instances taste sensation may be altered as well.⁸

Mechanisms

The exact mechanism of injury is still a subject of debate but a number of theories have been proposed.⁵

Direct Trauma from the Injection Needle

One of the oldest theories is that the needle contacts the nerve directly, thereby traumatizing the nerve and producing a prolonged change in sensation. This could explain why the lingual nerve, which is only 3 to 5 mm from the mucosa and the intraoral landmark for mandibular nerve block, the pterygomandibular raphe, is most commonly involved (more than 70% of cases).^{1-3,5} When the mouth is open, the lingual nerve is held taut within the interpterygoid fascia, and because of its fixation, it cannot be deflected away by the needle.^{3,5,10,11} However, this nerve may be penetrated initially and further damaged upon localization of the lingula by needle orientation.¹⁸

In correct execution of the mandibular block technique, the practitioner contacts bone to ensure proper deposition of the local anesthetic.¹ A long bevelled needle is often used to create less severe tissue and nerve damage on insertion, but the tip of these needles is much more prone to becoming barbed when contacting the bone or when used for multiple injections.⁵ In one study, 78% of the long bevelled needles used for conventional mandibular block appeared to be barbed at their tips after the procedure, regardless of bevel placement.¹⁹ More than two-thirds of these needles displayed the more dangerous outward facing barb.¹⁹ These barbs can rupture the perineurium, herniate the endoneurium and cause transection of multiple nerve fibres and even entire fascicles, especially on withdrawal.^{8,19,20} The Seddon¹³ and

Sunderland¹² classification systems categorize this type of injury as axonotmesis or second- or third-degree nerve injury, respectively.

Given the number of neurons and the thickness of the connective tissue layers, the lingual nerve averages 1.86 mm in diameter and the inferior alveolar nerve between 2 and 3 mm in diameter,^{8,11} but the diameter of the largest needle (25-gauge) used in dentistry is a mere 0.45 mm. Although any number of fascicles may be injured by direct needle trauma, causing transient paresis, it is believed to be impossible for the needle to shear all nerve fibres and connective tissue layers as in neurotmesis (Seddon classification) or fifth-degree injury (Sunderland classification).^{8,10,11}

Hematoma Formation

Several researchers have hypothesized that the needle may traumatize the intraneural blood vessels, creating an intraneural hematoma.^{5,8,11,19,20} Hemorrhage from the epineurial blood vessels would give rise to constrictive epineuritis, compressing the nerve fibres within the rigid tissue confines and causing localized neurotoxicity.^{5,19} The damage could be extensive a mere 30 minutes after the injection.¹¹ The release of blood and blood products from the epineurial blood vessels into the epineurium during hematoma formation would lead to reactive fibrosis and scar formation, applying pressure to and inhibiting the natural healing of the nerve.^{5,8-10}

Depending on the amount of pressure elicited by the hematoma, the injury could be classified as neurapraxia (Seddon classification) or first-degree injury (Sunderland) or as axonotmesis (Seddon) or second-degree injury (Sunderland). The former is characterized by focal block of neural impulses with maintenance of axonal and connective tissue continuity.^{10,12-14,19} Recovery occurs over several weeks with the release of pressure and subsequent remyelination.¹⁴ The latter is more severe, with variable amounts of axonal and endoneurial discontinuity and ensuing wallerian degeneration.^{10,12,14,15} The proximal segment attempts neurotization, and nerve sprouts can grow as much as 1 to 2 mm per day to span the gap created by the injury.^{12,14,15} The surviving Schwann cells and the empty endoneurial tubes attempt to guide the nerve regeneration and to provide the axon with metabolites for growth.¹⁵

Neurotoxicity of Local Anesthetic

More recent speculation suggests that the anesthetic itself causes localized chemical damage to the nerve, if it is injected intrafascicularly or becomes deposited within the nerve as the needle is withdrawn.^{5,21,22} It has been hypothesized that aromatic alcohols are produced in the area surrounding the nerves as a result of altered local metabolism of the anesthetic.^{8,11} The presence in the anesthetic or on the needle of alcohols and sterilizing solutions, which were

used in the past, has previously been blamed for nerve injuries.^{3,8,20,22} Chemical trauma has been shown to cause demyelination, axonal degeneration and inflammation of the surrounding nerve fibres within the fascicles.²³ As a result, the nerve–blood barrier breaks down, and endoneurial edema follows. One group of authors hypothesized that this edema causes ischemia, which is followed by an attempt by the nerve to heal. During this period of reperfusion, reactive free radicals can cause cytotoxic injury to the nerve.²³

In some studies, the anesthetics prilocaine and articaine have caused more injuries per use than lidocaine.^{5,7,8} Both of these anesthetics are supplied at higher concentrations,⁸ which will (after metabolism) produce greater levels of toxic metabolites.^{23,24} At higher concentrations, lidocaine has also been shown to cause neurotoxic damage following both perineural and intrafascicular injection.^{11,24}

Incidence of Injury

It has become apparent that the injection of local anesthetic can produce prolonged or permanent alteration of sensation along part or all of the distribution of either the maxillary (V_2) or mandibular (V_3) branches of the trigeminal nerve.^{5,11} These altered sensations can be categorized as anesthetics, paresthesias or dysesthesias.^{14,21} Anesthetics represent the total absence of sensation, including pain. Paresthesias encompass a broader category of abnormal sensations, such as “pins and needles,” which may not be unpleasant. Dysesthesias represent a form of spontaneous or mechanically evoked painful neuropathy. This category can encompass hyperalgesia (a rapid and exaggerated painful response to nonpainful stimuli), hyperpathia (a delayed and prolonged pain response), sympathetic mediated pain (pain that is worsened by increasing sympathetic tone) and anesthesia dolorosa (pain in an area of anesthesia).^{14,21}

It is well known that an electric shock sensation, with subsequent immediate anesthesia, can occur when a patient undergoes inferior alveolar, lingual or mental nerve block. This unwelcome shock sensation is believed to occur when the needle contacts part of the nerve trunk.²¹ The incidence of this sensation has been estimated at between 1.3% to 8% of all mandibular block injections, depending on the sample size.^{4–6,10,11,25} Numerous studies have demonstrated that an electric shock sensation is not indicative of permanent nerve injury, even though damage to the nerve may occur because of needle contact.¹¹ This form of direct trauma heals within 2 weeks in 81% of patients, with no residual damage to the nerve.¹¹ Upward of 15% of the patients who experience electric shock sensations may go on to experience further prolonged or even permanent altered

sensation,^{10,11} though this estimate may be high. Only 57% of the patients who experience prolonged altered sensation also experienced an electric shock sensation or painful injection at the time of anesthetic delivery.⁵

When estimating the incidence of nerve injury after dental injection, only noninvasive dental procedures should be included; in the case of a surgical procedure, it must be assumed that the surgery is the cause of any nerve injury.⁵ The most commonly involved nerve is the lingual nerve (tongue) and it accounts for more than two-thirds of the cases in the literature; the inferior alveolar nerve (lip and chin), including the mental nerve, accounts for less than one-third of the injuries, with the chorda tympani (taste) being involved minimally.^{5,8} Although extremely rare, altered sensation in the maxilla can also result from anesthetic injections.⁸ Early estimates predicted the likelihood of such a complication as 1 in 785,000 injections.⁸ More recently, another author approximated this number at between 1 in 160,571 and 1 in 26,762 mandibular blocks;⁵ this increase in incidence was attributed to increased awareness through recent publications and greater use of potentially neurotoxic anesthetics.^{5,26} Using this most recent estimate, we can extrapolate that the average full-time dentist should expect to have 1 or 2 nonsurgical patients affected by this postinjection complication.⁵

Two-thirds of patients with permanent nerve involvement experience anesthesia or paresthesia, whereas one-third experience dysesthesias, which have much greater social and psychological impacts.^{5,8,27} For reasons unknown, dysesthesias occur at higher frequency after dental injections (34%) than after surgery (8%).^{5,7} In comparison to those who underwent surgical procedures, patients who experienced nerve damage after minor dental procedures felt more disabled.⁷ Perhaps patients undergoing surgical treatment are better informed of the risks beforehand.

Sensory Testing

In most sensory testing, the entire distribution of the affected nerve seems to be involved, rather than a small number of fascicles.^{5,11} It has been estimated that the inferior alveolar and lingual nerves contain between 7,000 and 12,000 axons in various fascicular arrangements.¹⁵ In one recent study, the lingual nerve of 33% of patients contained a single fascicle at the level of the lingula.²⁸ More distally, in the third molar region, the lingual nerve may contain between 7 and 39 fascicles. The lower number of proximal fascicles may be the reason for permanent sensory disturbances along the entire distribution of the lingual nerve. The inferior alveolar nerve, however, has a minimum of 3 fascicles, which could account for the

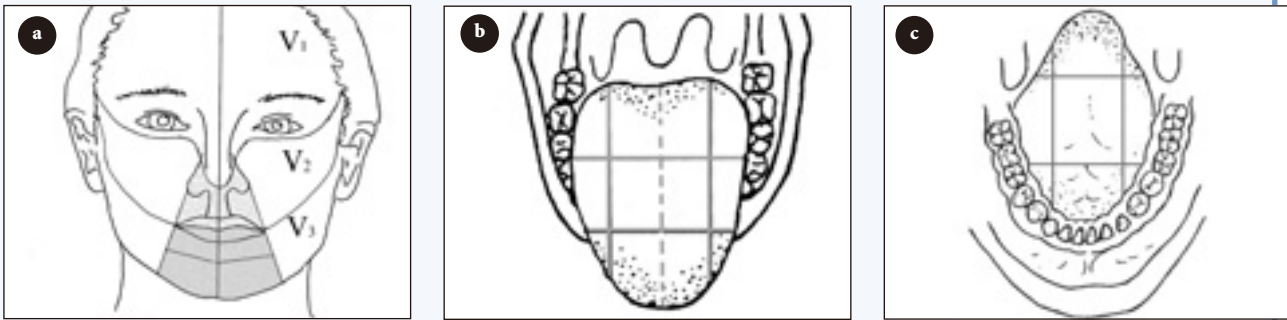


Figure 2: Diagrams for neurosensory assessment. **(a)** The mental region of V_3 can be tested for inferior alveolar and mental nerve injuries. Note its division into 4 quadrants of approximately equal size. The premaxillary region of V_2 can be tested for superior alveolar nerve injuries. **(b)** The tongue is divided into sextants on either side of the midline to represent the anterior, middle and posterior thirds of both the medial and lateral halves. **(c)** The ventral surface of the tongue and floor of the mouth can be documented in a similar fashion.

ability to regain sensation (through compensatory innervation from the uninjured fascicles).²⁸

Following diagnosis of prolonged altered sensation caused by dental injection, continued follow-up is necessary.^{9,29} If there is no improvement within 2 weeks, then referral to an oral surgeon or an oral pain specialist is advised for a baseline sensory exam.⁹ It is essential to document the mechanism and the date of the initial injury, the symptom history, prior treatment and its effect, functional deficits (speech and mastication difficulties, tongue and cheek biting, taste dysfunction^{8,27,29}) and the presence of any underlying medical disorder (e.g., psychological problems).⁹ Altered sensations of either the tongue or the mental area can be documented using the diagram shown in Fig. 2.

Numerous tests are used to define the extent of the injury; however, these tests are qualitative and highly dependent on both the patient's subjective assessment and the practitioner's expertise.³⁰ Pinprick testing, which represents pain, is used to map out the area of altered sensation. Von Frey's hairs are then used to evaluate touch and pressure sensation. Directional sense is determined using a fine paintbrush, and positional sense using a blunt point. Static and moving 2-point discrimination can be useful, as can testing of temperature sensation using Minnesota thermal disks. The taste sensations of sweet, salt, sour and bitter can also be subjectively analyzed.^{5,9,14,21,30,31} If dysesthetic pain is present, then a diagnostic nerve block can be used to determine if the neuropathy is of peripheral origin.^{9,14} Central problems such as anesthesia dolorosa and sympathetic mediated pain will not resolve with local anesthetic.^{9,21} Some people even advocate electroencephalography, although its usefulness has yet to be determined.²¹ It has been proposed that evaluations should continue every 2 weeks for 2 months, then every 6 weeks for 6 months, every 6 months for 2 years and yearly indefinitely if a full recovery has not occurred.²¹

Prognosis

Patients with nerve injury after dental injection, regardless of the presence or absence of electric shock sensation, have a good prognosis. Spontaneous complete recovery from the altered sensation occurs within 8 weeks in 85% to 94% of cases.^{4,5,7,14} The inferior alveolar nerve often carries a more favourable prospect of recovery because of the confines of the bony canal and the lack of mobility relative to the lingual nerve.⁷ Patients with paresthesia lasting beyond 8 weeks after the initial injury have less chance of full recovery.^{11,21,29}

Treatment

Few studies have specifically addressed treatment for this type of nerve injury. Both surgical and pharmaceutical management have been used, with varying success.^{11,14-16,29,32-39} Patients who experience troublesome prolonged alteration in sensation may be candidates for treatment based loosely on the inclusion criteria for nerve injuries sustained by surgical procedures. The selection criteria of some authors include anesthesia for 2 to 3 months with no improvement, paresthesia for 4 to 6 months with no improvement for 2 months or dysesthesias of minimum duration 2 to 3 months.⁷ Dysesthesias relieved by diagnostic injections of local anesthetic show the most potential to benefit from surgical treatment; however, symptoms may not completely resolve and in some cases may worsen with invasive surgical investigation or treatment.^{5,9,14}

In the rare instance when the microneurosurgeon and the patient agree on exploratory surgery, variable results can be achieved with decompression involving external and internal neurolysis, excision with direct anastomosis or excision with placement of a nerve graft (including autogenous sural, greater auricular and medial antibrachial nerve grafts,^{9,14} saphenous vein grafts,³⁵ and alloplastic Gore-Tex, collagen and polyglycolic acid

tubes^{9,32}). However, most results in the literature reflect treatment for nerve injuries related to surgical trauma.^{11,14–16,29,32–39} Only one study has published results directly related to a microneurosurgical approach to nerve injuries caused by dental injection; in that study, the overall treatment outcome with exploration and neurolysis was poor.⁵

Long-term nonsurgical pharmacologic therapy has also been used for some patients. Medications such as anticonvulsants (carbamazepine, phenytoin, gabapentin, topiramate), benzodiazepines, tricyclic antidepressants, antispasmodics (e.g., baclofen) and anesthetics (e.g., lidocaine)^{9,11,40} have been shown to benefit patients suffering from dysesthesias, especially those that are sympathetically mediated.⁹

Conclusions

Nerve injuries after dental injection are of concern to dentists, as injection of local anesthetic is one of the procedures that dentists perform most frequently. Although this form of injury is rare, more patients are being referred to dental or medical specialists, who have experience in nerve assessment and repair, for follow-up and possible treatment. Overall, the prognosis is excellent, and the vast majority of patients recover during the first few weeks. However, the longer the symptoms persist, the less promising the outcome. Increased awareness of this form of complication will allow the general practitioner to effectively communicate the implications and prognosis of the altered sensation to affected patients. Because anesthetic solutions with elevated concentrations are implicated in many such injuries, their widespread use may need to be reconsidered by dentists and dental specialists alike. ♦

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Cervicofacial and Mediastinal Emphysema Complicating a Dental Procedure

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ABSTRACT

Cervicofacial subcutaneous emphysema is an infrequently reported sequela of dental surgery. It may be caused by the inadvertent introduction of air into the soft tissues during procedures using high-speed, air-driven handpieces or air-water syringes. In this paper, we present a case in which subcutaneous emphysema developed in a middle-aged woman following routine restorative treatment. We review the features of the condition and its treatment and discuss means of prevention.

MeSH Key Words: dental high-speed technique/adverse effects; face; mediastinal emphysema/etiology; subcutaneous emphysema/etiology

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Subcutaneous emphysema in the head and neck is a well-known clinical condition associated with maxillofacial trauma, infections, tracheostomy and radical neck dissection. Emphysema resulting from dental treatment, although rare, has also been reported following the use of high-speed, air-driven surgical drills and compressed air syringes during restoration, extraction and endodontic procedures. The first case of subcutaneous emphysema associated with a dental procedure was reported in 1900.¹ Since then, it has been associated with air-generating dental instruments during restoration² and surgical extraction,³⁻⁵ endodontic treatments,⁶ trauma from biopsy⁷ and cheek biting.⁸

Subcutaneous emphysema occurs when air is introduced into the fascial planes of the connective tissue. The trapped air is often limited to the subcutaneous space in the head and neck. However, it can disperse deeply along the fascial planes of the neck and result in

para- and retropharyngeal emphysema, with potential extension into the thorax and mediastinum. These are rare but potentially life-threatening complications.

The clinical presentation is characterized by a sudden onset of hemifacial swelling with the sensation of fullness of the face and closure of the eyelids on the involved side. Crepitation is noted on palpation and is almost pathognomonic for subcutaneous emphysema.

A case of periorbital and cervicofacial emphysema is presented in which parapharyngeal, retropharyngeal and mediastinal extension occurred. The route of spread along contiguous fascial planes is reviewed and potential complications are discussed.

Case Report

A 43-year-old female patient was referred by her dentist to the department of emergency medicine at the Health Science Centre at the University of Manitoba with an immediate and



Figure 1: Orbital view shows an ill-defined swelling of the periorbital region.



Figure 2: Intraoral view reveals a defect at the attached gingiva.



Figure 3: Plain axial computed tomography (CT) scan demonstrating air (arrows) in the lateral pharyngeal spaces on the left side.



Figure 4: Plain axial CT scan demonstrating air (arrows) within the retropharyngeal space posterior to the trachea.

progressive swelling over the upper chest, neck, left cheek and temporal region. The dentist had noticed the hemifacial swelling develop during a routine dental restoration of the left maxillary second premolar under local anesthesia. A standard high-speed air-driven drill was used in the restoration. No rubber dam was placed during the procedure.

The swelling persisted, and the patient exhibited no systemic signs associated with an allergic reaction. On initial presentation, the patient denied any dyspnea or dysphagia.

Physical examination showed a marked swelling of the left neck, cheek and temporal regions. Palpation revealed crepitus of the affected areas. Her left eye was swollen shut and exhibited a large preseptal distension that was also crepitant on palpation (Fig. 1). Her vital signs were stable: blood pressure 131/73 mmHg, heart rate 104 beats per minute, respiratory rate 16 breaths per minute and body temperature 37.1°C orally. The trachea was midline, and auscultation revealed clear respirations bilaterally. The patient phonated normally with no evidence of airway obstruction or distress. She reported visual acuity unchanged. Light reflex and extraocular movements were intact. The remainder of her physical examination was normal.

Intraoral examination revealed partial dentition with no evidence of gross decay or infection. The patient's soft tissue was unremarkable with little or no evidence of edema or swelling. Adjacent to her upper left second premolar was a thin band of minimally attached keratinized tissue (Fig. 2), which was easily lifted from the underlying alveolus.

Computed tomography (CT) of the thoracocervicofacial region confirmed diffuse subcutaneous emphysema extending from the infratemporal space to the orbital–buccal region and branching into the submandibular, parapharyngeal (Fig. 3), retropharyngeal (Fig. 4) and mediastinal spaces. CT showed no evidence of any masses or fluid collections.

The patient was admitted to the oral and maxillofacial surgery service for airway monitoring and intravenous prophylactic antibiotic therapy. The following day, the patient's clinical condition was improved and swelling was slightly reduced. After 48 hours the swollen eye opened, cervicofacial distension was reduced and her vital signs were stable. She was discharged on oral antibiotics with a follow-up appointment.

Complete resolution of her symptoms occurred over the next 3–4 days with no untoward sequelae.

Discussion

This case report recounts an occurrence of subcutaneous emphysema after routine restorative dental treatment in a healthy adult. The unilateral enlargement of her face was almost undoubtedly caused by compressed air from a high-speed handpiece, which entered the connective tissue fascia through a small intraoral dehiscence of attached gingiva.

Cervicofacial subcutaneous emphysema results from the entry of air or gas into soft tissue planes. The condition is usually a result of treatment with high-speed, air-driven surgical drills and compressed air syringes during restoration, extraction and endodontic procedures. The incidence of subcutaneous emphysema appears to parallel the increase in use of high-pressure dental instruments,⁹ and it is remarkable that cervicofacial emphysema is not a more commonly reported complication of dental procedures.

The differential diagnosis of sudden onset head and neck swelling after dental procedures includes hematoma, cellulitis, allergic reaction, angioedema and subcutaneous

Table 1 Clinical features of cervicofacial emphysema

Immediate	Subsequent
Local swelling	Diffuse swelling
Crepitus	Local erythema
Local discomfort	Pain
Radiographic findings	Pyrexia

emphysema.¹⁰ Anaphylaxis (loss of vascular tone indicated by a precipitous fall in blood pressure caused by contact with an allergen) would result in more profuse, bilateral facial manifestations with possible cardiorespiratory symptoms. Angioedema (a massive escape of fluid into the tissue from blood vessels causing large edematous swellings) usually appears in the maxilla as a reddened area with well circumscribed rings and a burning sensation. Hematoma (a pooling of blood in tissues) can also be suspected, although crepitus is not usually present.

Cervicofacial emphysema develops as a result of the introduction of air into fascial planes of the head and neck. These planes consist of loose connective tissue containing potential spaces between layers of muscles, organs and other structures. Once air enters the deep soft tissue under pressure, as is the case when air–water cooled handpieces or air–water syringes are used, it will follow the path of least resistance through the connective tissue, along the fascial planes, spreading to distant spaces.¹¹ Air travelling through the neck may enter the retropharyngeal space, which lies between the posterior wall of the pharynx and the vertebral column. From here it may penetrate the alar fascia posteriorly, to enter Grodinsky and Holyoke’s so-called danger space, which is in direct communication with the posterior mediastinum. When air collects in this space, it can compress the venous trunks resulting in cardiac failure or compress the trachea resulting in asphyxiation. Further complications of subcutaneous emphysema include pneumothorax, pneumopericardium and mediastinitis.

Also of concern is the possibility of life-threatening air embolism.¹² Air enters an open vessel via a pressure gradient between the extravascular and intravascular tissue. When air enters the veins it travels to the right side of the heart, then to the lungs. This can cause the vessels of the lung to constrict, raising the pressure in the right side of the heart. In a patient who is one of the 20% to 30% of the population with a patent foramen ovale, if the pressure rises high enough, the gas bubble can then travel to the left side of the heart and on to the brain or coronary arteries. When death occurs, it is usually the result of a large bubble of gas stopping blood from flowing from the right ventricle to the lungs.

In over 90% of cases, the onset of emphysema-based swelling occurs either during surgery or within 1 hour afterward.¹³ Considered an unexpected complication, the clinical presentation and course are generally predictable. The clinical features of cervicofacial emphysema following dental surgery (Table 1) commonly involve the initial symptoms of swelling due to a foreign, space-occupying material in the soft tissue — in this case air. The area rapidly becomes swollen and mild crepitus is detected when the tissue is palpated. Local discomfort is slight and is due only to tenseness of the tissues.¹⁴ Limited inflammation of the tissue is observed. Trismus may also be present but is site dependent and often slight. More serious emergency situations arise with the spread of air into the para- and retropharyngeal spaces potentially resulting in respiratory difficulty with risk of airway embarrassment. Migration to the thorax and mediastinum may result in compromised respiratory and cardiac function with possible death.

The treatment of subcutaneous emphysema varies with the severity of the condition and the experience of the physician. Most cases will begin to resolve after 2–3 days of supportive treatment with complete resolution after 7–10 days.¹⁵ Observation for potential airway embarrassment, cardiovascular or infectious processes is often all that is required. Surgical decompression of extensive emphysema should not be routinely undertaken as it is not likely to be effective and may increase or spread the entrapped gas.¹⁶

The potential for infection is also a concern as the air entering the tissues is contaminated with oral bacteria.¹⁷ Post-resolution purulence within the fascial spaces has been reported.¹⁸ Penicillin is an empirical first choice due to its appropriate narrow-spectrum coverage of normal oral flora.² Analgesics are prescribed as necessary, but are rarely required as discomfort is often minimal.

In most cases, patients can be reassured with an explanation of the nature and course of the process. Patients should be cautioned to return in the case of increased swelling or difficulty breathing.

Conclusions

Cervicofacial and mediastinal emphysema are rarely reported in the literature. The simple etiology of the condition and the frequent use of air-driven instruments that exhaust near the operative site make it likely. Although entry sites are often quite small and superficial, significant amounts of air are able to enter the soft tissues and travel easily along fascial planes for some distance. Operative sites should be closely inspected and protected to reduce or prevent air from entering. Handpieces that exhaust air into the surgical field should not be used. Air-cooled instruments used in surgical orofacial procedures should vent air away from the immediate area or recirculate the air to reduce the risk of introducing it into tissues. The

occurrence of sudden swelling during a dental procedure, marked by crepitus within the soft tissue, should raise suspicion of subcutaneous emphysema. ❖

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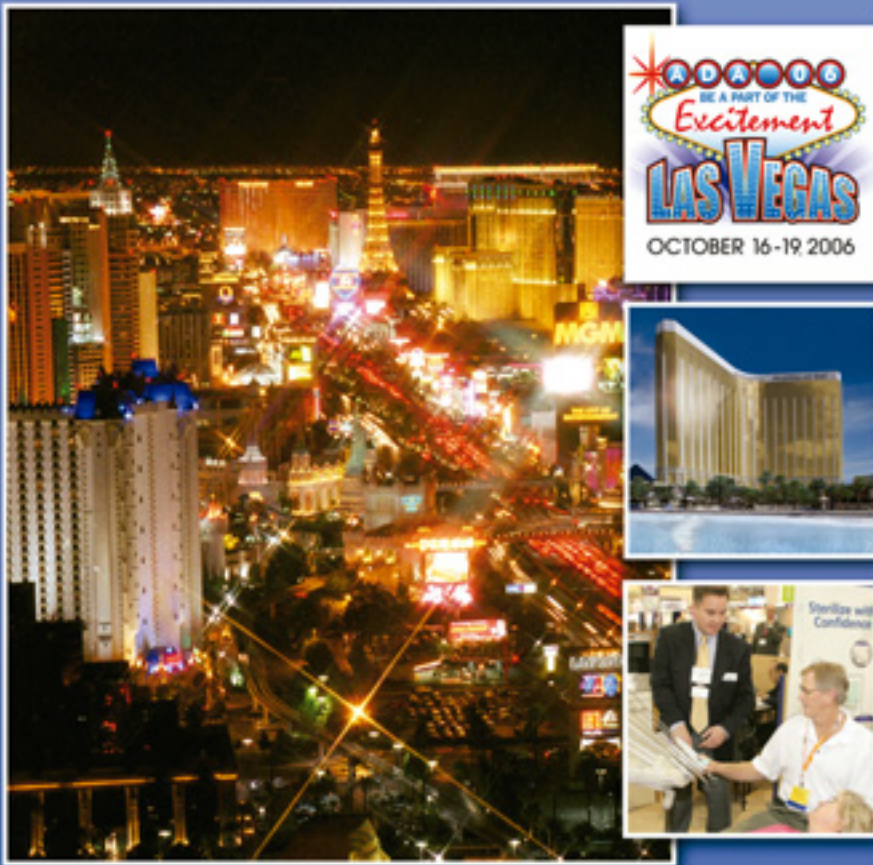
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ALBERTA - Wetaskiwin: Full-time associate required for a progressive family practice 30 minutes south of Edmonton. Opportunity for transition available. Contact Dr. Ron Tratch, 5007 51 Ave., Wetaskawin, Alberta. Call: (780) 352-5016 or fax: (780) 352-4568. D2381

ALBERTA - Whitecourt: Fantastic opportunity for one or two dentists to associate in an office 1 1/2 hours north west of Edmonton. Do as little or as much general dentistry as you wish with an orthodontist, denturist and implant specialist performing treatments right out of our clinic. Utilize a microscope or soft-tissue lasers for your precision procedures. Our busy office needs caring dentists to treat its large patient base with an exceptional associate agreement for the right candidates. No weekends or evenings if not desired. Applications and correspondence to: rdbalic@telus.net. D2465

BRITISH COLUMBIA - Abbotsford: Quality practice offers a bright future for dentist dedicated to maintaining the high standards set by the departing associate. Future buy-in potential for the right candidate, three years experience preferred. Abbotsford, a rapidly growing community still placing high priority on family values, is surrounded by the natural beauty of mountains and the Fraser Valley. There are highly esteemed private two Bible colleges and a public university college. A new hospital/cancer centre is under construction down the street from the practice. The office is strategically located in an impressive new brick professional building one minute off the Trans-Canada Highway. The waiting room welcomes you with a fireplace and wingback chairs. There are six operatories, four of them offering a view of Mount Baker, Washington. A strong hygiene program is in place and harmonious staff await you. The city is an hour east of Vancouver, a mile from the U.S. border, and within easy driving distance of many ski resorts including Whistler Mountain. If you are drawn to this first-class opportunity, please email: abbdn06@hotmail.com. D2036

BRITISH COLUMBIA - Castlegar: Full-time associate required for a busy general practice. Well-established patient base, long-term staff, six operatories. Castlegar is a wonderful caring community. We enjoy all the seasons have to offer. We have a community college, sports and pool complex and the regional airport. If this is the place for you, owner would like to arrange for a future buy-in or purchase of the practice. Email: donellis@shaw.ca. D2059

BRITISH COLUMBIA - Duncan: Southern Vancouver Island, 50 km north of Victoria, part-time/full-time associate required. Fantastic opportunity to join solo dentist in a well-established and rapidly growing general and cosmetic practice. Committed to new technology and CE. Future buy-in welcome. Great recreational area and affordable housing. Easy access to Victoria and Vancouver. tel: (250) 748-1322, fax: (250) 746-4342. D1827

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BRITISH COLUMBIA – Kamloops:
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BRITISH COLUMBIA – Kelowna:
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BRITISH COLUMBIA - Southeast:
Full-time associate needed for busy dental clinics in southeastern B.C. Long-time commitment with possible buy-in. Experience an asset. Reply to: cranberyydds@yahoo.ca. D2487

BRITISH COLUMBIA - Squamish:
An “outdoors sophisticate” is required for associate (purchase an option) in a busy 4-chair state of the art ground floor retail practice – 30 minutes to Vancouver and Whistler. Dental office is 1 block from Garibaldi Springs Hotel and Golf Course, 5 minutes from new Quest University. You must have minimum 1 year experience, with superb cosmetic, endo, and surgery skills – ability to work

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**Gordon Rice, Clinic Manager
Crestwood Dental Clinic
200, 1899 Dunmore Road SE,
Medicine Hat, AB T1A 1Z8
Phone: (403) 526-0777 Fax: (403) 529-2137
email: cdc@memlane.com**

D2440

**LABRADOR-GRENFELL REGIONAL HEALTH AUTHORITY
General Dentist**

The Labrador-Grenfell Regional Health Authority invites applications for the position of permanent General Dentist on a full-time basis for northern Newfoundland and southern Labrador, effective as soon as possible. This is a challenging and interesting area where dental services are provided from regional bases in Newfoundland and traveling clinics on the south Labrador coast. Dependent on the base location, the traveling requirement is approximately one third of the total working time.

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Fringe benefits include 6 weeks paid leave in a twelve month term. Assistance with relocation and continuing education costs are available. Accommodations are available at a reasonable rate.

Applicants must be eligible for registration with the Newfoundland and Labrador Dental Board. Experience in oral surgery is desirable. Experience in general dentistry is essential.

Labrador-Grenfell Regional Health Authority is also currently prepared to consider applicants who are available for short-term locum appointments. Interested individuals are encouraged to contact the organization for further details and discussions.

The successful applicant will be required to submit a Certificate of Conduct.

Interested individuals are requested to submit resumes, along with names and addresses of references, stating competition number, 06.03, to:

**Human Resources Department
Labrador-Grenfell Regional Health Authority
St. Anthony, NL A0K 4S0 Canada
Telephone: (709) 454-0347 Fax: (709) 454-3301
Email: humanresources@grhs.nf.ca**

D2050

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D2426

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D2531

NEWFOUNDLAND - St. John's: Full-time associate wanted for a busy,

expanding dental office located in the city of St. John's, next to the largest university in Atlantic Canada - Memorial University. This is an ideal position for a new dentist. If you enjoy both city and outdoors life, high commission, full patient load and relaxed work environment please email your resume to: zacharypanca@yahoo.ca or call: 709-722-7747.

D2610

NORTHWEST TERRITORIES - Yellowknife:

And surrounding communities. Associate position. Excellent opportunity in North America's diamond capital. Good recreation and outdoor activities. Work in a modern friendly dental clinic with excellent remuneration and benefits. For more information reply to fax: (867) 873-4410.

D1754

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D1497

ONTARIO - Cambridge: Part-time associate required for general practice, 2 days per week. Please fax resume to: (519) 622-3608.

D2461

ONTARIO - Eastern: Oral maxillofacial surgery. Busy full-scope practice looking for associate leading to partnership. OR time available and GA suite in office. One hour east of Toronto. If interested reply to: CDA Classified Box # 1858.

D1858

ONTARIO - Ottawa (Central East): Full-time associate for a 20-year well-



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The Department of Dentistry in the Faculty of Medicine and Dentistry at the University of Alberta is seeking an experienced geriatric oral healthcare professional to fill its newly created endowed Chair in Geriatric Oral Health. The successful candidate will be a dentist with advanced/graduate training in both the clinical and research aspects of geriatric oral healthcare.

The successful candidate will develop a broad-based research program in all aspects of geriatric oral health. Based on this research, as well as other relevant geriatric oral health data, the successful candidate will develop, with faculty colleagues, comprehensive geriatric oral healthcare curricula for dentistry and dental hygiene students. In addition, a continuous professional learning program will be developed for dental health professionals. The Faculty will also pursue, with the successful candidate, the possible development of a

geriatric oral health residency/graduate program. Candidates with PhD training and a proven track-record in research grant funding are preferred. The position is available as soon as the appropriate candidate is selected.

Please send your complete curriculum vitae, a vision statement for developing a program in geriatric oral health care, and the names of three references to:

**Dr. Doug Dederich, Acting Department Chair
Department of Dentistry
Faculty of Medicine and Dentistry
3036 Dentistry/Pharmacy Centre
University of Alberta
Edmonton, Alberta, Canada T6G 2N8**

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. If suitable Canadian citizens and permanent residents cannot be found, other individuals will be considered. The University of Alberta hires on the basis of merit. We are committed to the principle of equity in employment. We welcome diversity and encourage applications from all qualified women and men, including persons with disabilities, members of visible minorities, and Aboriginal persons.

D2606

established busy family/cosmetic practice. Opportunity for full ownership in 1 - 2 years. Fax: (613) 745-3305. D2373

ONTARIO - Ottawa: Associate dentist wanted. Searching for a people-oriented dentist seeking to associate with the opportunity of becoming an owner. Please fax resume to: (613) 820 2714.

D2557

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ONTARIO - Toronto: Large, busy family practice in North Toronto. Looking for an experienced associate leading to partnership. Fax: (416) 398-7863. D2106

ONTARIO - Toronto: Associate for downtown Toronto practice. Walking minutes from Bay Street, theatre district and City Hall. Build your own practice with no capital investment. Opportunity to purchase the principal's practice after suitable period. Email resume to: dental.recruiter@sympatico.ca. D2034

ONTARIO - 19 locations: Experienced associate required for our well-established, busy practice. Enjoy a small-town or a large city atmosphere. For more information visit our website at www.altima.ca or contact: Dr. George Christodoulou, Altima Dental Canada, tel. (416) 785-1828, ext. 201, or email: drgeorge@altima.ca. D1783

ONTARIO/QUEBEC: Looking for bilingual associate for 5 mature and busy practices, southwest Quebec and/or Cornwall, Hawkesbury, Ontario area. Full schedule (crown/bridge, endodontics, etc.). Stability, flexibility and respect assured. Possible sale. Seeing is worth believing. Contact: Luc, tel: (450) 370-7765. D1674

ONTARIO - Kincardine: We are looking for a full-time associate to join our practice. If you are interested in being fully scheduled, want to work with an experienced staff, and think you might enjoy life in a beautiful resort town, we have the position you are looking for. Our modern office is fully equipped with six operatories, intraoral cameras, and computers. Buy-in option would be available for the right candidate. This would be an excellent investment opportunity for a new graduate. Please call Michael Walden at: (519) 396-2641. D2616

ONTARIO - Whitby: Associate needed, can work in one or two offices, very personable. Please call: (905) 655-1500. D2638

ONTARIO - Windsor: Oral and maxillofacial surgeon. Full-scope, professionally satisfying, private practice opportunity. Associateship position leading to partnership. Please reply in confidence to: Dr. Joe Multari, tel: (519) 252-0985, fax: (519) 734-8853 or email: multari@mnsi.net. D1812

PRINCE EDWARD ISLAND: Oral and maxillofacial surgeon. Opportunities available for associateship leading to partnership in all aspects of busy oral surgery practice in Atlantic Canada. Hospital privileges available. If interested please reply to: CDA Classified Box #1548. Tel: (902) 892-2970, (bus.) (902) 892-8337, (res.) email: habbi@islandtelecom.com. D1548

QUÉBEC - Gatineau: Congé de maternité. Recherche dentiste de mi-

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SASKATCHEWAN - Saskatoon: Excellent opportunity to join an outstanding family practice with great patients and incredible staff. This is a well-established busy practice in a high-income area of Saskatoon. Our modern, progressive, fully-computerized office also offers all the high-tech equipment (digital radiography, laser, digital cameras, CAESY, intraoral cameras, etc.) and a very strong perio-hygiene program. This is an outstanding opportunity to take over a well-established active patient base, with excellent new patient flow left by departing associate. We are seeking an experienced, high-energy, motivated associate dedicated to the same high standards shared by our team. If you have a passion for high-end restorative and cosmetic dentistry and a desire to practise all aspects of general dentistry with a focus on clinical excellence, we have a very lucrative associateship in place for you. Previous associate billings averaged \$50,000/mo. Option to buy-in available. Please fax resume to: (306) 934-7224 or email: northend.dental@shaw.ca. D2640

UNITED STATES - Arizona and Illinois: A unique and exciting opportunity is available for general dentists in central Illinois and sunny Arizona. Earn between 250-350K per year with paid malpractice and health insurance while working in a great environment. The group is owned and operated by Canadians and will look after all immigration needs. Email: dwole@gmail.com, fax: (312) 274-0760 or call: (630) 706-0647. D2456

VANCOUVER ISLAND: Associate for Comox Valley family practice. Must be interested in future purchase and transition to owner as associate.

Reply: Box 1357, Comox, BC, V9M 7Z9
or email: Covaldentist@shaw.ca. D2005

YUKON – Whitehorse: Land of the midnight sun. Come for the adventure. Associate required. Are you looking for a Northern Exposure? Check out our website: www.klondike-dental.com. Phone Dr. Pearson at home: (867) 668-4618, fax: (867) 667-4944 or Berni at work: (867) 668-3152. D1828

Conferences

NORTHWEST DENTAL EXPO 2006: Presented by Edmonton and District Dental Society. Friday, September 22, 2006. Featuring Mark Colonna, Edward Philips, Debra Stewart. Enquiries phone: (780) 459-1275. D2607

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CDA Canadian Growth Funds					
Aggressive Equity fund (Altamira)	up to 1.00%	20.1%	18.3%	10.9%	9.2%
Common Stock fund (Altamira)	up to 0.99%	14.6%	17.2%	6.7%	8.1%
Canadian Equity fund (Trimark) ^{†1}	up to 1.50%	5.9%	11.7%	6.2%	8.3%
Dividend fund (PH&N) ^{†2}	up to 1.20%	5.9%	14.4%	10.0%	16.7%
Income Trusts fund (Sceptre)	up to 1.45%	14.4%	23.3%	n/a	n/a
Special Equity fund (KBSH) ^{†3}	up to 1.45%	14.0%	19.2%	3.7%	12.4%
TSX Composite Index fund (BGI) ^{††}	up to 0.67%	18.8%	19.8%	9.8%	9.9%
CDA International Growth Funds					
Emerging Markets fund (Brandes)	up to 1.77%	15.7%	18.3%	11.3%	2.1%
European fund (Trimark)	up to 1.45%	15.2%	7.4%	-6.4%	2.5%
International Equity fund (CC&L)	up to 1.30%	7.9%	7.0%	-4.9%	1.3%
Pacific Basin fund (CI)	up to 1.77%	18.6%	11.0%	-2.8%	-0.9%
US Small Cap fund (Trimark)	up to 1.25%	-4.4%	2.2%	-7.8%	n/a
Global fund (Trimark) ^{†4}	up to 1.50%	7.6%	8.1%	4.3%	8.2%
Global Stock fund (Templeton) ^{†5}	up to 1.77%	6.1%	11.4%	1.2%	n/a
S&P 500 Index fund (BGI) ^{††}	up to 0.67%	-2.3%	2.9%	-3.0%	5.5%
CDA Income Funds					
Bond and Mortgage fund (Fiera)	up to 0.99%	-1.0%	2.4%	4.7%	5.4%
Fixed Income fund (McLean Budden) ^{†6}	up to 0.97%	-2.6%	3.4%	5.5%	7.6%
CDA Cash and Equivalent Fund					
Money Market fund (Fiera)	up to 0.67%	2.5%	2.1%	2.2%	3.2%
CDA Growth and Income Funds					
Balanced fund (PH&N) ^{†7}	up to 1.20%	4.5%	7.9%	3.1%	6.3%
Balanced Value fund (McLean Budden) ^{†8}	up to 0.95%	4.8%	9.1%	5.7%	8.6%

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: ¹Trimark Canadian Fund, ²PH&N Dividend Income Fund, ³KBSH Special Equity Fund, ⁴Trimark Fund, ⁵Templeton Global Stock Trust Fund, ⁶McLean Budden Fixed Income Fund, ⁷PH&N Balanced Pension Trust Fund, ⁸McLean Budden Balanced Value Fund.

^{††} Returns shown are the total returns for the index tracked by these funds.

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