



JCDA

Journal of the Canadian Dental Association

Vol. 69, No. 7

July/August 2003



Painting by Dr. William Liebenberg

**Spontaneous
Mandibular
Fracture**

**Creeping
Attachment
Following
Gingival Grafting**

**The Interaction
between Sleep
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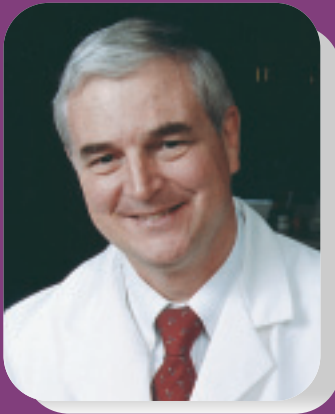
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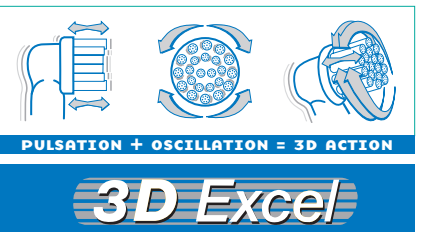
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Guest Editorial

FIVE DECADES — WHERE HAVE THEY GONE?

Editor's Note: Dr. Wesley J. Dunn became the editor of the *Journal of the Canadian Dental Association* in August 1953.

One half-century. Five decades. Fifty years. For the age of the universe, it is but the blink of an eye; in human terms, a professional lifetime.

In 1953, Canada's Prime Minister was Louis St. Laurent. Dwight Eisenhower became President of the United States and Tito assumed the presidency of Yugoslavia. Queen Elizabeth II was crowned in Westminster Abbey. Josef Stalin died and was succeeded by Nikita Khrushchev. Dag Hammarskjöld became Secretary-General of the United Nations. Edmund Hillary and Tenzing Norgay reached the summit of Mount Everest. Jonas Salk's polio vaccine was formally certified. Francis Crick and James Watson discovered the double helix structure of DNA. The first open heart surgery was performed in Philadelphia. *The Globe and Mail* cost five cents and Swanson sold its first TV dinner.

The Canadian Dental Association occupied a stately house on Saint George Street in Toronto. Dr. Don W. Gullett was the General Secretary, while also serving as Registrar/Secretary-Treasurer of the Royal College of Dental Surgeons of

Ontario and Secretary-Treasurer of the Dentists' Legal Protective Association of Ontario. He was aided by two administrative/secretarial assistants for his CDA responsibilities and by one secretary for the other two organizations. There was one bilingual receptionist, who also served as the CDA librarian. The newly appointed editor, then in full-time practice, spent one-half day a week at headquarters, but edited articles, wrote editorials, proofed galleys and made up page proofs on his kitchen table. Not exactly state-of-the-art!

For the 15-year period following 1953, CDA was in the forefront, encouraging the creation of five new dental schools — thus doubling the number of dental educational institutions. Other contributions by our national organization are legion — support of fluoridation, submissions to the Hall Royal Commission on Health Services, opposition to the taxation of dental benefits, development of CDAnet, promotion of dental insurance, conduct of the Dental Aptitude Test, establishment of the Seal of Recognition, and effective liaison with the federal government on a host of important issues. And as a 'gathering place' for a healthy profession, the *Journal* has had and has a role to play, the importance of which cannot be overstated.

The content of this entire publication could be given over to the developments in dentistry during this past half-century. In periodontics, the main improvement is related largely to biological research and newer knowledge of the tissues and the microbes inhabiting pockets. The direct bonding of brackets in orthodontics has had a major impact. There have been significant advances in orthognathic surgery, digital radiography, and root canal treatment with rotary instruments. New impression

materials were developed, as well as new stress control and tissue design philosophies for removable partial dentures. The appearance of dental implants has been a quantum advance. It, in turn, has generated developments in bone and soft tissue surgery. Dentistry's historic interest in and promotion of the prevention of dental and oral disease have continued unabated.

Let me contend that not all we have witnessed has been professionally acceptable progress. Since the Supreme Court of Canada, in 1990, essentially struck down advertising restrictions, what now appears in the Yellow Pages, on TV and radio, in newspapers and magazines, on roadside billboards, in 'value pack' savings' coupons, and in the circulation of 'newsletters' to other than dentists' own patients, is professionally demeaning. It is readily acknowledged there is an important — indeed essential — business aspect to the practice of dentistry. But we are *not* commercial competitors. The crude, promotional methods of the marketplace should have no home within a respected health profession. One cannot fault the provincial governing bodies. No one, as yet, has been able to draft an enforceable bylaw bearing on a definition of 'good taste.' There is a lot of 'bad taste' out there, inimical to dentistry, which historically had to struggle from an itinerant craft to a highly respected profession.

I am not even remotely prescient to foresee what the next 50 years will hold, but I'm confident CDA and the *Journal*, both of which serve the profession so magnificently, will continue to have a major impact on dentistry's future.

Wesley J. Dunn
Editor
Journal of the Canadian Dental Association (1953–1958)



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President's Column

WE'RE RESPONDING TO YOUR CONCERNS



Dr. Tom Breneman

The 4 weekends from May 24 until June 15 were a very busy time for organized dentistry in Canada: 8 of our 10 provincial associations held their annual meetings and the joint Canadian Dental Association and Alberta Dental Association & College (ADA&C) annual congress took place in Jasper, Alberta.

The 2003 Jasper Dental Congress was a huge success, with an increase in attendance over previous ADA&C conferences of more than 85%. (Plan now to attend the 2004 Pacific Dental Conference, cohosted by CDA and the Association of Dental Surgeons of British Columbia; it will be held March 4–5 at the Vancouver Convention & Exhibition Centre.)

All the provincial annual meetings were attended by at least one member of your CDA management team. The intent of this representation was to update our members on the activities and issues in which CDA is currently involved, and to learn more about the

regional concerns of our membership. Past experience has taught us that local issues often become national ones, and sometimes in a hurry.

There was a common theme throughout these annual meetings, having to do with current and anticipated dental manpower shortages. The current shortage revolves around dental hygienists and the difficulty many practitioners have in finding enough hygienists to provide the preventive care requirements for their practices.

Adding to this frustration is the stated intention of our university-based programs and hygiene licensing bodies to add a baccalaureate degree to graduation and licensing requirements. This extra year of education with no additional clinical component will add to our shortages, at least for the near term.

Economics 101 and the theory of supply and demand suggest that alternate sources of training will be developed as the need for adequately trained personnel increases. Will the advent of new alternate sources of supply eventually place our university hygiene programs at risk, as governments and universities continually monitor and re-evaluate the need for these expenditures?

The second area of concern is the current and future supply of dentists. Government statistics indicate that, by 2011, all professional groups (including dentistry) will be in a manpower shortage situation. We are all aware that in certain areas of our country (both urban and rural), there are many unfilled openings for associates, practices for sale and opportunities to establish successful practices.

The solution to this shortage is multifactorial. We need to continue to address the issues identified at the Dental Academic Summit to ensure the ongoing vitality of our dental

schools. The issues are selection to ensure success in practice, and selection for diversity, so that graduates are interested in all areas of practice, not just fee-for-service. CDA is now organizing a follow-up Dental Admissions Conference, to be held this October. The conference will look at ways to ensure that applicants to our schools are well suited to meet the demands of our profession upon graduation.

Currently, we have a reciprocal accreditation agreement with schools in the United States, whereby graduates from an accredited school can — if they successfully complete the National Dental Examining Board of Canada (NDEB) exams within 7 years of graduation — apply for a licence to practise in Canada. Graduates from non-accredited schools, though, need to successfully complete a qualifying or degree completion program to be able to write the NDEB exams and apply for licensure in Canada. Regrettably, there are not enough positions in these programs to meet our future needs.

This September, Citizenship and Immigration Minister Denis Coderre will address CDA's first-ever meeting of its General Assembly (under our new governance system). Minister Coderre will discuss changes to the certification of foreign-trained professionals.

The need for hard data on manpower issues is obvious and CDA — together with Human Resources Development Canada and allied dental groups — is well along in a study to produce future needs projections in the delivery of oral health care.

So, the concerns of our members are being listened to and acted upon. Thanks to all for the fabulous hospitality at the meetings and for the opportunity to map the future of our profession.

*Tom Breneman, DMD
president@cda-adc.ca*

Letters

Editor's Comment

The *Journal* 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. 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.

Rapid Expansion

We have been using rapid palatal expansion (RPE) for a long time in young and older adults with at least a 75% success rate. Moreover, we almost always use a Haas-type appliance, i.e. with "palatal coverage." Our experience in this field started when we decided to try expansion systematically before referring the patient for a corticotomy. We were at first very surprised at the success rate. Hence, we agree that this procedure is certainly worthwhile.¹ We almost think it would be somewhat exaggerated to refer young patients aged 16 to 18 to surgery without first trying this procedure.

*Dr. Jules E. Lemay
Sherbrooke, Quebec*

Reference

1. Stuart DA, Wiltshire WA. Rapid palatal expansion in the young adult: time for a paradigm shift? *JCDA* 2003; 69(6):374-7.

Wait Time for Blood Donations

Canadian Blood Services (CBS) recently received approval from Health Canada to reduce the wait time for a blood donor to donate, following dental cleaning or filling. Previously, the wait time following such procedures was 3 days, as continues to be the case for other types of dental treatment, including extrac-

tion, root canal or dental surgery. With this revision, however, blood donors will only be deferred from donating for the duration of the day of their cleaning or filling treatment.

We are now in the process of implementing this change. We anticipate that it will be introduced in the near future at all CBS locations across the country and that this revision will be well received by blood donors. In this regard, our donor clinics and CDA members' offices can anticipate that this change will contribute to easing those conflicts, which may have arisen when blood donors were scheduled for dental appointments within 72 hours of their blood donation. A formal implementation date is still pending.

*Dr. Graham Sher
Chief executive officer
Canadian Blood Services
Ottawa, Ontario*

Response from CDA

Health Canada has approved a modification to the exclusion period for donors after dental cleaning or filling. While this change may be of significance to CBS, it does not address CDA's basic concern with this policy: the complete absence of evidence showing that an exclusion period after dental treatments increases the safety of blood products.

We understand that in order to manage theoretical liabilities, CBS may have a need to require such exclusion, in spite of the absence of scientific support. But we feel that CBS has a responsibility to clearly explain the rationale for this exclusion, as well as its precautionary nature to donors. The refusal — first of the Red Cross and now of CBS — to provide this information is resulting in patients needlessly worrying about the safety of visits to their dentists and unfairly

imposes the burden of explaining CBS's policy on individual dentists.

*George Weber
Executive director, CDA
Ottawa, Ontario*

Whose Patients Are They, Anyway?

When elderly patients who have received our professional care (crowns, fixed bridgework, removable prosthodontics, cosmetic and restorative procedures) enter a nursing home or long-term care institution and become homebound, whose patients do they become? Especially when they cannot visit you in your office.

These institutions are required by law to have a medical director on the premises. The dental profession has not prepared itself for this serious problem, which is obvious when patients are examined in nursing homes. You see fixed bridgework failing, rampant decay, dentures that do not fit, infections, hypertrophied tissue and undetected cancers.

Because the dental profession has not educated the aligned professions, they do not understand the extent of destruction that neglect can cause. Not providing oral hygiene, yearly examinations and treatment can cause oral health tissue to be destroyed and loss of teeth.

*Dr. James Morreale
Hamilton, Ontario*

Systemic Disease

We would like to echo a statement made in *JCDA*: "Dentists are often the first health care professionals to diagnose a systemic disease through observation of its oral manifestations."¹

One potentially related systemic disease omitted in the article is obstructive sleep apnea (OSA), characterized by intermittent and repeated obstruction of the upper airway. This

obstructed breathing pattern causes disturbed sleep and has been linked to significant cardiovascular morbidity.² Patients with OSA often snore and have large necks. They may be excessively sleepy, hypertensive and overweight. There is a high incidence of gastroesophageal reflux disease (GER) in OSA patients. Dentists recognizing evidence of GER coexisting with possible OSA ought to consider having the patient assessed by a physician trained and experienced in sleep medicine.

The relationship between OSA and GER is controversial and multifactorial.³ Exaggerated negative thoracic pressures created by breathing against an obstructed upper airway are thought to play a role in the pathogenesis of GER.

OSA is of interest to the dental community, given the ever-expanding role of treatment for snoring and breathing disorders using oral appliances to reduce upper airway obstruction. It would be useful to document a beneficial effect upon GER via reduction of obstructed breathing with oral appliance therapy.

Presently, the treatment of choice for moderate to severe sleep apnea is the application of nasal continuous positive airway pressure (nCPAP), involving the delivery of positive air pressure via the nose, which acts as a pneumatic splint, maintaining airway patency. nCPAP effectively abolishes upper airway obstruction, and has also been shown to apply direct mechanical compression to the esophagus.⁴ A recent study demonstrates a correlation between the severity of OSA and severity of GER.⁵ The study showed nCPAP was effective in treating OSA and decreased the frequency of GER symptoms by 48%.

Mr. Thom Russell, RRT(Adv), RPsGT
Dr. Allan Oliver, BDS
Victoria, British Columbia

References

1. Barron RP, Carmichael RP, Marcon MA, Sándor GKB. Dental erosion in gastroe-

sophageal reflux disease. *JCDA* 2003; 69(2): 84-9.

2. Dart RA, Gregoire JR, Gutterman DD, Woolf SH. The association of hypertension and secondary cardiovascular disease with sleep-disordered breathing. *Chest* 2003; 123(1):244-60.

3. Valipour A, Makker HK, Hardy R, Emegbo S, Toma T, Spiro SG. Symptomatic gastroesophageal reflux in subjects with a breathing sleep disorder. *Chest* 2002; 121(6):1748-53.

4. Fournier MR, Kerr PD, Shoenuit JP, Yaffe CS. Effect of nasal continuous positive airway pressure on esophageal function. *J Otolaryngol* 1999; 28(3):142-4.

5. Green BT, Broughton WA, O'Connor JB. Marked improvement in nocturnal gastroesophageal reflux in a large cohort of patients with obstructive sleep apnea treated with continuous positive airway pressure. *Arch Intern Med* 2003; 163(1):41-5.

CDA/Dentsply Students Clinician Program Contest

As one of the judges for the CDA/Dentsply Students Clinician Program contest, I would like to congratulate all those who participated in this event.

The quality of the presentations was excellent. I personally acquired useful information in areas that affect me. The topics and presenters were:

- Regulation of osteoclast morphology and motility by an antibody against the AvB3 integrin — Jill D. Bashutski, University of Western Ontario (1st prize).
- Three-dimensional analysis of the root canal morphology of human teeth by microscopic computed tomography (CT) — Dr. Donald Yu and Carmen Wong, University of Alberta (2nd prize).
- Effects of farnesol on the switch pattern of *Candida albicans* colonies — Céline Messier, University of Montreal.
- A comparison of the costs and patient acceptability of professionally applied topical fluoride and varnish — James Noble, University of Toronto.
- The sound of dentistry: from audioanalgesia to cellular phones in teeth — Mitch Miller, McGill University.

- Sof-Lex brush versus Occlubrush: a comparative study — Christine Bellavance, Stéphanie Gamache-Faucher, Fany Martel, Marie-Chantale Pelletier and Nancy Wassef, Laval University. Consultants: Dr. Lise Payant and Dr. Denis Robert.
- Resin-modified glass ionomer cement: a therapeutic restorative material for the treatment of dental caries in the pediatric patient — Tracy Doyle, Dalhousie University.
- Oral malodorous compound inhibits superoxide scavenger in human gingival fibroblast — Wendy Lee, University of British Columbia.
- A comparison of race and profile rotary endodontic instruments in curved canals — Dennis Dodds and Kabir Viridi, University of Saskatchewan.
- Role of the frontal sinus as functional matrix in craniofacial growth — Milos Lekic, University of Manitoba.

My disappointment was with the lack of exposure the event received. I would like to suggest that in the future the abstracts of the topics (10 in all) be published in advance in *JCDA*.

Dr. Ronald Breault
Edmonton, Alberta

CORRECTION

Please note a correction for the May insert *Partners in Prevention*. Under New Research on page 5, the studies' objective should read "supragingival" instead of "subgingival".

CDA Participates in SARS Meeting

On May 29, CDA staff attended a meeting of health organizations concerned with severe acute respiratory syndrome (SARS), chaired by the Canadian Medical Association. The meeting had originally been planned as an after-the-fact analysis of the impact of the SARS outbreak on the medical community, especially public health. Due to the resurgence of the outbreak in June, the meeting also served as a situational analysis.

The participants considered whether there was value in establishing more formal linkages to create a “SARS action network” that would then be in place to share information during similar future episodes. Most agreed that there is merit in continuing liaisons, at least for the near future. The group may also present findings to the National Advisory Group on SARS headed by Dr. David Naylor, dean of medicine at the University of Toronto, established by Health Minister Anne McLellan to evaluate Canada’s management of the SARS outbreak.

During roundtable discussions, each organization explained the actions that were taken within their communities during the crisis; what the impact of the SARS outbreak is on its membership; and in some cases, identified shortcomings in the system or management of the crisis.

The role of private health care providers — including dentists, pharmacists and others — during a public health crisis was acknowledged. During the meeting, CDA was thanked for preparing a list of masks and suppliers, which is being widely used as a resource in the medical community. ♦

Osteoporosis Affects Oral Health — AGD

Osteoporosis increases patients’ risk factors for tooth loss, bone loss and periodontal disease, according to the Academy of General Dentistry (AGD).

“Adults looking for the warning signs of osteoporosis may find key symptoms in their mouth that should signal alarms about their overall health,” reports Dr. Barbara J.

Steinberg, clinical professor of surgery at Drexel University College of Medicine in Philadelphia, speaking on behalf of the AGD. “Because teeth are embedded in the jawbone, people with low bone mass may experience oral health problems as a result.”

Early warning signs of osteoporosis may include more severe gum disease, bone loss around teeth, tooth loss, dentures becoming loose, or ill-fitting dentures that lead to mouth sores and difficulty speaking or eating. Dentists can detect these early signs through dental radiographs, which show the amount of jawbone loss from year to year, signifying advancing stages of the disease.

For more information about osteoporosis and oral health, visit the AGD’s Web site at www.agd.org. ♦

High-Quality Online Health Resources

Web resource sheets for consumers, health professionals, and health planners and policymakers are available on the Web sites of the Canadian Cochrane Network and Centre (CCN/C), the Canadian Coordinating Office for Health Technology Assessment and the Canadian Task Force on Preventive Health Care.

The resource sheets provide Web surfers with lists of high-quality Internet health resources, with links to each Web site listed. The sheets can be downloaded from the CCN/C Web site at <http://cochrane.mcmaster.ca/eblinks.asp>. ♦

Results of Recent NDEB Examination

On March 1–2, the National Dental Examining Board of Canada (NDEB) Written Examination and Objective Structured Clinical Examination (OSCE) were administered to graduates of accredited U.S.

COVER ARTIST

The cover art for the July-August *JCDA* — titled *Surrealist Balance* — is the work of Dr. William H. Liebenberg of West Vancouver.

“This acrylic painting, when viewed as displayed, captures a timeless moment of my daughter’s handstand on the beach,” Dr. Liebenberg notes. Viewers are encouraged to experience his creative intention by flipping the image vertically to experience the secondary objective, which is more surrealist. When flipped, the painting takes on an incongruous image of Dr. Liebenberg’s daughter reaching upwards through a corporeal representation of the heavens.

Dr. Liebenberg received his Bachelor of Dental Science in 1982 from the University of Witwatersrand in South Africa. He emigrated to Canada in 1993 and practises general dentistry on Vancouver’s North Shore. ♦



and Canadian undergraduate dental programs. The Written Examination is multiple-choice, assessing basic and applied clinical science knowledge. The OSCE is a station-type exam, which tests clinical judgment. Both examinations are regularly reviewed, statistically analyzed and validated. Workshops are held every year, during which invited faculty members from different universities construct new questions. General practitioners subsequently evaluate these questions for eventual use in future exams.

This year, 354 graduates of Canadian programs passed the written exam (a 99% success rate, while 76 graduates of U.S. programs also succeeded in doing so (a 95% success rate).

As for the OSCE, 380 graduates of Canadian programs passed (a 99% success rate), while 66 graduates of U.S. programs were successful (an 84% success rate). ♦

A P P O I N T M E N T S

Palmerston-based Dentist Elected ODA President



Dr. K. Blake Clemes

Dr. K. Blake Clemes has been elected the 136th president of the Ontario Dental Association (ODA).

A 1983 graduate of the University of Western Ontario's faculty of dentistry, Dr. Clemes started a private practice in Hamilton, before moving

to Guelph and eventually settling in Palmerston. From 1984 to 2000, Dr. Clemes was staff dentist at Guelph General Hospital and at St. Joseph's Hospital. He is currently on staff at the Palmerston and Listowel Hospitals. In 1998, Dr. Clemes was named Fellow of the Pierre Fauchard Academy. ♦

ADSBC Elects New President



Dr. Wayne Halstrom

The new president of the Association of Dental Surgeons of British Columbia is Dr. Wayne Halstrom of West Vancouver.

Dr. Halstrom, whose Vancouver practice specializes in the treatment of sleep-disordered breathing, is a 1960 graduate of the University of Alberta's faculty of dentistry. He is currently a member of CDA's Board of Directors. Dr. Halstrom is a former president of the Medical Services Association and teacher at the University of British Columbia's faculty of dentistry. ♦

New Member Elected to CDSPI Board

Dr. Jeff Williams has been elected to a 3-year term on the Board of Directors of Canadian Dental Service Plans Inc.

A resident of Tatamagouche, N.S., Dr. Williams is associate for Atlantic Canada with ROI Corporation — a national dental practice appraisal, brokerage and consulting firm. He is also an associate member of the Nova Scotia Dental Association.



Dr. Jeff Williams

In addition to holding a Master's in Business Administration from Saint Mary's University, Dr. Williams has completed the Canadian Securities Course and the Personal Financial Planning Course from the Canadian Securities Institute, as well as several other courses of study from the Canadian Institute of Financial Planning. ♦

O B I T U A R Y

Shankman, Dr. Lorne J.: Dr. Shankman of Vancouver passes away suddenly on April 11. He graduated from the University of Ontario in 1972. ♦

For direct access to the Web sites mentioned in the News section, go to the July/August *JCDA* bookmarks at <http://www.cda-adc.ca/jcda/vol-69/issue-7/index.html>.

**JCDA Wishes
DIAC
a Happy 25th!**

JCDA congratulates the Dental Industry Association of Canada (DIAC) on the occasion of its 25th anniversary.

Visit DIAC's attractive new Web site at <http://www.diac.ca>.

2003 Jasper Dental Congress:

Jasper the Bear is flanked by ADA&C president Dr. Joey Brown (left) and CDA president Dr. Tom Breneman.



The Canadian Dental Association and the Alberta Dental Association & College (ADA&C) teamed up for a very successful 2003 Jasper Dental Congress. The event, which took place May 22–25 at the Fairmont Jasper Park Lodge and other venues in the scenic resort community, drew about 1,500 dental professionals from across Canada for 4 days of professional development and social activities with a distinctively Rocky Mountain flavour. The joint CDA/ADA&C event also included a trade show in the Jasper Activity Centre that drew 76 exhibitors. The Congress featured a world-class program of speakers, whose topics were targeted at the entire Canadian (and indeed global) dental community. Speaking at the welcoming reception, CDA president Dr. Tom Breneman talked about the importance of teamwork for the future of the Canadian dental profession. He cited the 2003 Jasper Dental Congress as a fine example of a successful partnership between 2 dental associations and said he looked forward to more such joint initiatives.



The CDA/Dentsply Student Clinician Program conducted by CDA and sponsored by Dentsply International gives 1 student from each accredited dental school in Canada the opportunity to compete for awards and receive an expenses-paid trip to the CDA convention. Participants compete in 1 of 2 categories — clinical application and techniques or basic science and research. Awards are granted to first- and second-place winners. The top 2 participants were honoured during the CDA/Dentsply Awards Reception. Participants and guests at the reception were: (back row, l. to r.): Dr. Doug Smith, chair, Dentistry Canada Fund; Dr. Alfred Dean, vice-president, CDA; Dr. John Currah, judge; Dennis Dodds, dental student, University of Saskatchewan; Jennifer Miles, territory manager, Dentsply Canada; Mark Fiedler, territory manager, Dentsply Canada; Angela Best, product manager, Dentsply Canada; Dr. Ronald Breault, judge; Dr. Linda Niessen, vice-president, clinical education, Dentsply International; (front row, l. to r.): dental students Mitch Miller, McGill University; Nancy Wassef, Laval University; Céline Messier, University of Montreal; Carmen Wong, University of Alberta (2nd prize winner); Kabir Virdi, University of Saskatchewan; Milos Lekic, University of Manitoba; Tracy Doyle, Dalhousie University; Jill Bashutski, University of Western Ontario (1st prize winner); and James Noble, University of Toronto.

A Successful Partnership between CDA and ADA&C

CDA's vice-president Dr. Alfred Dean presents the CDA/Dentsply Certificate of Recognition to first prize winner Jill Bashutski, a dental student at the University of Western Ontario in London, during the CDA/Dentsply Awards Reception at the 2003 Jasper Dental Congress. Looking on is Angela Best, product manager, Dentsply Canada.



Wayne Franklin, Calgary branch manager, Ash Temple (left), and Michel Hart, chairman of Ash Temple.

S p o n s o r s

The 2003 CDA/ADA&C Jasper Dental Congress was made possible through the generous support of the following organizations. We would like to extend a special thanks to all our sponsors.



Spontaneous Mandibular Fracture in a Partially Edentulous Patient: Case Report

- Philippe Libersa, DMD, PhD •
- David Roze, DMD •
- Thierry Dumousseau, MD •

A b s t r a c t

This article describes the case of a 78-year-old patient whose mandibular fracture was treated with miniplate osteosynthesis. After initial treatment, panoramic radiography revealed a fracture of the miniplate, and at follow-up, a loosening of the replacement plate. For the dental practitioner, this clinical case highlights the importance of panoramic radiography and occlusal analysis and stabilization for diagnosis of mandibular fracture, evaluation of miniplate fracture and treatment, especially in the absence of trauma.

MeSH Key Words: fractures, spontaneous/surgery; mandibular fractures; postoperative complications

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This article has been peer reviewed.

The mandible is the most commonly fractured bone of the face because of its prominent and exposed position.¹ It is the only moving bone of the facial skeleton, and its physiological functions must be considered in the treatment of trauma.² The most common mechanisms of injury to this bone include motor vehicle crashes, falls, fights, sports injuries and removal of the third molar.³ Spontaneous fractures without an obvious cause are rare.

Treatment methods include closed reduction with maxillomandibular fixation (Gunning splint), closed reduction without maxillomandibular fixation, and open reduction and fixation with interosseous wires or screws and plates.⁴

This report presents a case of spontaneous mandibular fracture subsequent to placement of a new denture, as well as fracture of the miniplate used to reduce the original fracture.

Case Report

An almost totally edentulous 78-year-old man without a significant dental history was admitted to hospital with a large, hard edema in the left lateral mandibular area. Fifteen days before being admitted to hospital, the patient had consulted his dentist with pain and swelling of the left mandibular region. The only treatment provided by his

dentist at that time was a course of antibiotics, which had been ineffectual.

Clinical examination revealed impaired function and mobility, as well as severe edema.

Panoramic radiographic examination showed a displaced mandibular fracture and bone radiolucency in the left second molar area (Fig. 1). During surgery to repair the fracture, a biopsy sample for later analysis was taken from the area where the bone appeared radiolucent on the panoramic radiographs, as immediate histological examination seemed unnecessary.

Treatment by Gunning splints seemed to be the treatment of choice, to avoid the risk of aseptic necrosis of the mandible. However, this method of treatment was impossible in this case because the mandibular fracture was 2 weeks old, and the massive edema would have prevented correct placement of the denture on the mandibular ridge. Therefore, the fracture was reduced by an intraoral open reduction and was stabilized with a titanium miniplate. The fracture site was stabilized with special forceps, and monocortical titanium screws were placed on each side of the fracture. During this reduction, the mandibular incisors, which had a questionable prognosis, were not extracted, because the patient had recently been fitted with a new partial lower and upper denture. Histological examination revealed a nonmalignant osteitis lesion.

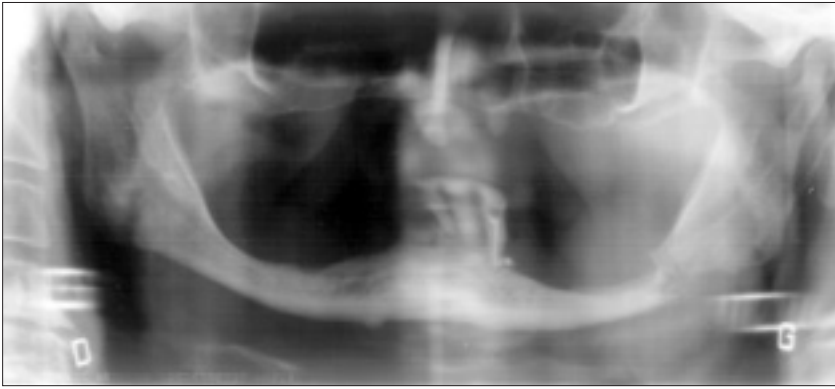


Figure 1: Panoramic radiograph demonstrates displacement of the fragments of mandibular bone.

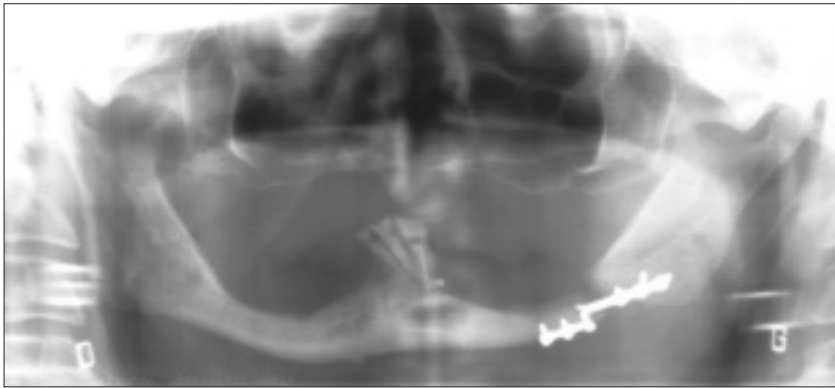


Figure 2: Panoramic radiograph of the patient 3 weeks after fracture reduction shows miniplate fracture.

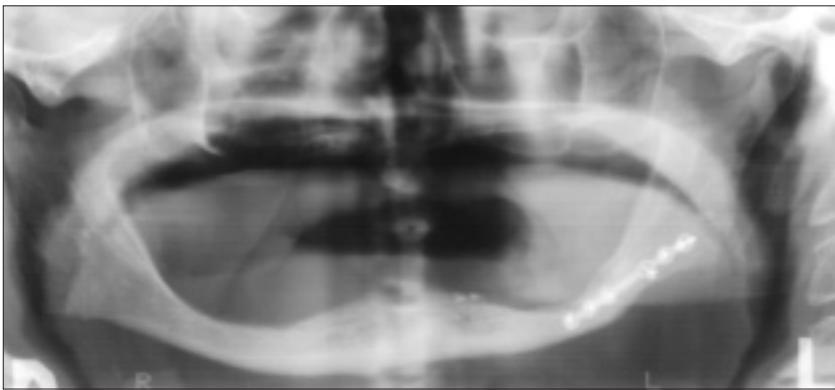


Figure 3: Panoramic radiograph of the patient 1 year later confirms good bone healing.

Postoperative panoramic radiography demonstrated satisfactory reduction of the fracture. The patient was advised to eat a liquid diet for 2 days, followed by a diet of soft food for 6 weeks.

Temporary paresthesia of the left mandibular area disappeared progressively. Twenty-one days after the surgery, the patient noticed renewed pain in the same area, and panoramic radiography revealed that the titanium miniplate had fractured (Fig. 2). It was presumed that this fracture might have occurred because of an internal defect in the miniplate, as the patient had complied strictly with his

postoperative instructions and had been unaware of any cracking sound while using the mandible. A second surgical procedure was performed to remove the “defective” miniplate, which was replaced by another plate of the same design. Postoperative panoramic radiography confirmed that the miniplate and the screws were well placed in the mandibular bone. Eight days later, follow-up panoramic radiography showed that one of the monocortical screws immediately adjacent to the fracture had become partially unscrewed. This development suggested that unusually strong forces were being exerted in this area.

During precise questioning, the patient reported that a new upper and lower denture had been fitted 2 weeks before the mandibular fracture. He had continued wearing the new upper denture day and night after the fracture reduction. After consultation, it was decided to delay further surgery, as the displacement of the screws was limited. However, the patient was asked to refrain from wearing his maxillary denture at any time.

Two months later, radiographic examination confirmed the formation of a bone callus. Three months later, the remaining lower anterior teeth were extracted. After 1 year, a complete head and neck examination showed the stability of the fracture segments, and panoramic radiography confirmed good bone healing (Fig. 3).

Discussion

Although the mandible is membranous during its embryonic stage, its physical structure resembles a bent long bone,⁵ and it is subject to biomechanical compression, bending, torsion and traction.⁶ This arch of corticocancellous bone projects downward and forward from the base of the skull and constitutes the strongest and most rigid component of the facial skeleton.

However, it is more commonly fractured than the other bones of the face, and the teeth or lack thereof may be the most important factor in determining where fractures occur. Other factors that can influence fractures are the forces exerted by the muscles of mastication, the occlusal loading pattern and the osseous anatomy. Fractures of the edentulous mandible most often occur in elderly people.

As the patient ages, bony strength is reduced. According to Thaller,⁷ there is no definitive recommendation for either closed or open reduction in cases of fracture in the edentulous mandible. In the case reported here, Gunning splints could not be used, so osteosynthesis of the fractured edentulous mandible was achieved by means of miniplates and monocortical screws. Bicortical screwing would be preferred from the perspectives of infection and pseudarthrosis,⁸ however, monocortical screwing causes fewer occlusal disorders. When troubles exist, they are minor, and only rarely is a second procedure required.^{9,10}

Complications may occur in miniplate osteosynthesis of mandibular fracture, but miniplate fractures are rare (occurring in 0.8% to 2% of cases, according to Edwards and others¹¹) and are generally due to noncompliance with instructions to eat a soft diet for 4 to 6 weeks.

The present case emphasizes 2 important aspects of treatment: (1) radiography for diagnosis and evaluation of mandibular fracture and treatment and (2) occlusal analysis and stabilization.¹²

Panoramic radiography is a standard clinical procedure for the evaluation of oral abnormalities, such as spontaneous edema in an edentulous area, especially when the patient does not report a specific precipitating event.

In the case reported here, panoramic radiography revealed a mandibular fracture with radiolucency in the fracture area. After fracture repair, postoperative panoramic radiography is recommended.¹³ In this case, the miniplate fracture suspected clinically was confirmed by panoramic radiography. A latter panoramic radiograph (after the second surgical reduction) showed that one of the monocortical screws had become unscrewed and also contributed to the diagnosis of this complication. Finally, the radiography confirmed the reduction of the fracture and formation of bone callus.

This case also underlines the importance of occlusal analysis before prosthetic rehabilitation and before treatment of a mandibular fracture. In a partially or totally edentulous patient with maxillary or mandibular dentures (or both), maximum occlusal forces are reduced; however, imperfect occlusion can still induce mandibular fracture, especially in a patient with mandibular atrophy. According to Barber and others¹⁴ and Childress and Newlands,¹² the goal of mandibular fracture repair is good occlusion, as illustrated by this case.

In this case, imperfect occlusion between the 3 remaining mandibular anterior teeth and the new maxillary denture seems to have been the main cause of fracture of the atrophic mandible, as well as the fracture of the miniplate osteosynthesis after reduction.

This patient did not report hearing any characteristic cracking sounds while eating or after surgery. He also carefully followed the recommended diet. Therefore, it is

surmised that nocturnal bruxist forces were responsible for these fractures. When these occlusal forces were removed, secondary osseointegration and satisfactory union were achieved without further surgery, despite the unscrewing of the monocortical screw. A new denture was fitted 9 months later, and total function and esthetic appearance were restored. ♦

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The authors have no declared financial interests.

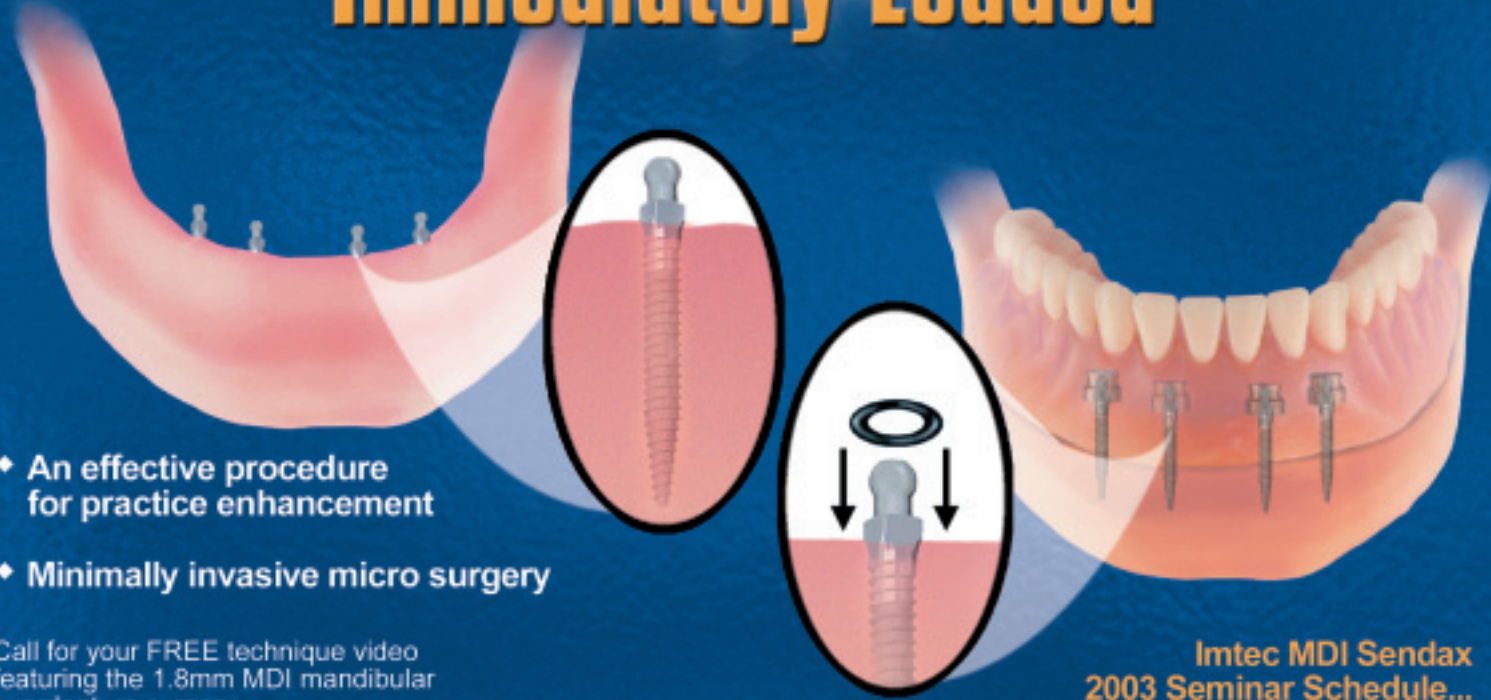
References

1. Banks P. Killey's fractures of the mandible. 4th ed. London: Butterworth-Heinemann Wright; 1991. p. 1-112.
2. Archer WH. Fractures of the facial bones and their treatment. In: Archer WH, editors. Oral and maxillofacial surgery. 5th ed. Philadelphia: WB Saunders; 1975. p. 259-60.
3. Iatrou I, Samaras C, Theologie-Lygidakis N. Miniplate osteosynthesis for fractures of the edentulous mandible: a clinical study 1989-96. *J Craniomaxillofac Surg* 1998; 26(6):400-4.
4. Joos V, Meyer U, Tkotz T, Weingart D. Use of mandibular fracture score to predict the development of complications. *J Oral Maxillofac Surg* 1999; 57(1):2-5.
5. Ma'aita J, Alwrikat A. Is the mandibular third molar a risk factor for mandibular angle fracture? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000; 89(2):143-6.
6. Gola R, Cheynet F, Carreau JP, Guyot L. [The value of an osteosynthesis arch-plate combination in the application zone in the treatment of fractures of the body of the mandible.] Intérêt de l'association arc-plaque d'ostéosynthèse en zone utile dans le traitement des fractures du corps de la mandibule. *Rev Stomatol Chir Maxillofac* 1996; 97(2):72-83.
7. Thaller SR. Fractures of the edentulous mandible: a retrospective review. *J Craniomaxillofac Surg* 1993; 4(2):91-4.
8. Jammet P, Souyris F, Atlan G, Dupoirieux L. [A comparative study of 2 series of mandibular osteosynthesis using screwed plates.] Étude comparative de deux séries d'ostéosynthèses mandibulaires par plaques vissées. *Rev Stomatol Chir Maxillofac* 1992; 93(2):76-9.
9. Peled M, Laufer D, Helman J, Gutman D. Treatment of mandibular fractures by means of compression osteosynthesis. *J Oral Maxillofac Surg* 1989; 47(6):566-9.
10. Souyris F, Lamarche JP, Mirfakhrai A. Treatment of mandibular fractures by intraoral placement of bone plates. *J Oral Surg* 1980; 38(1):33-5.
11. Edwards TJ, David DJ, Simpson DA, Abbott AH. The relationship between fracture severity and complication rate in miniplate osteosynthesis of mandibular fractures. *Br J Plast Surg* 1994; 47(5):310-1.
12. Childress SC, Newlands SD. Utilization of panoramic radiographs to evaluate short-term complications of mandibular fracture repair. *Laryngoscope* 1999; 109(8):1269-72.
13. Kawai T, Murakami S, Hiranuma H, Sakuda M. Radiographic changes during bone healing after mandible fractures. *Br J Oral Maxillofac Surg* 1997; 35(5):312-8.
14. Barber HD, Woodbury SC, Silverstein KE, Fonseca RJ. Mandibular fractures. In: Fonseca RJ, Walker RV, Betts NJ, Barber HD, editors. Oral and maxillofacial trauma. Philadelphia: WB Saunders; 1997. p. 473-526.

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Unique Creeping Attachment after Autogenous Gingival Grafting: Case Report

- Francisco J. Otero-Cagide, DDS, Dip Perio •
- M. Fermín Otero-Cagide, DDS, Dip Perio •

Abstract

This case report describes a unique creeping attachment that developed mesiobuccally on a deep, wide recession (3 mm) and extended along the remaining buccal recession (2 mm) of a maxillary first molar with a full-crown gold restoration subsequent to autogenous gingival grafting. Complete coverage of the root by this degree of creeping attachment on a restored multirooted tooth has not previously been reported in the dental literature.

MeSH Key Words: gingiva/physiology; gingiva/transplantation; wound healing

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Autogenous gingival grafting or epithelialized free gingival grafting is a well-established pure mucogingival procedure for increasing the width of attached gingiva.¹ Since its introduction in 1963,² the procedure has proven reliable in increasing attached gingiva and stopping progressive gingival recession. Also, long-term stability (up to 4 years) of these treatment outcomes has been demonstrated.³

Although root coverage is not a primary goal of autogenous gingival grafting, it may occur, in cases of narrow recession (< 3 mm), as a result of bridging, whereby some of the grafted tissue remains vital over the avascular zone of the root.⁴ Some root coverage may also result from another mechanism known as creeping attachment, which was described by Goldman and Cohen⁵ as the postoperative migration of the gingival marginal tissue in a coronal direction over portions of a previously denuded root. Creeping attachment has been reported by several clinicians and is apparently best observed on mandibular anterior teeth with narrow recessions.⁶⁻⁸ This phenomenon can be detected 1 to 12 months after graft surgery with an average coverage of about 1 mm.⁸

In 1982, Miller⁹ proposed a modification of the conventional technique for autogenous gingival graft surgery for root coverage. This modification used a thicker graft (2 mm) positioned over a carefully planed root surface that had been previously conditioned with citric acid. With detailed suturing marginally and apically, the graft could

be adapted in intimate contact with the recipient site. Later, Miller¹⁰ presented a classification of recession defects based on the position of marginal tissue recession in relation to the mucogingival junction and the level of interproximal tissues (Table 1). With the modified technique proposed by Miller, root coverage is more predictable and more successful with Class I and II defects, whereas only partial coverage can be expected with Class III defects. Root coverage in Class IV defects should not be expected. Successful root coverage was found to depend mainly on bridging and partly on creeping.¹⁰

This case report describes a unique creeping attachment that developed mesiobuccally on a deep, wide recession (3 mm) and extended along the remaining buccal recession (2 mm) of a maxillary first molar with a full-crown gold restoration subsequent to autogenous gingival grafting. To the authors' knowledge, this degree of creeping attachment on a restored multirooted tooth has not previously been reported in the dental literature.

Case Report

During a periodontal examination of a 45-year-old man at the Dental Clinic of the College of Dentistry, University of Saskatchewan, in 1995, it was found that there was an inadequate band of gingiva on the facial aspect of the maxillary first and second molars, and the mesiobuccal root of the first molar had a recession of 3 mm apicocoronally and 3 mm mesiodistally. The remaining buccal aspect had

2 mm of recession. A full-crown gold restoration had been placed 6 years before. There was mild to moderate gingival inflammation marginally. The recession defect was classified as Class II mesiobuccally and Class I distobuccally (according to the Miller classification). There was no loss of interdental bone or soft tissue (Figs. 1a and 1b).

The patient's medical history was noncontributory, and he had no complaints or discomfort. Since appearance was not a concern, it was decided to treat the site by Miller's technique for autogenous gingival grafting to achieve root coverage, particularly for the mesiobuccal root of the first molar, and also to increase the attached gingiva. As a full-crown restoration was planned for the second molar, it was recommended that the patient undergo autogenous gingival grafting of this tooth during the same surgical appointment, to increase the attached gingiva. The patient agreed

to this treatment plan, and therapy was initiated with instructions for plaque control, followed by scaling and root planing.

Surgical Procedure

During the surgical appointment, after local anesthesia had been achieved, the exposed root was planed thoroughly with a Gracey 7-8 curet, followed by burnishing a tetracycline hydrochloride solution (125 mg/mL) over the root with a cotton tip for 3 minutes. The area on the first molar that was to receive the gingival graft was prepared by creation of a partial-thickness flap according to Miller's techniques; the graft tissue (approximately 2 mm in thickness) was obtained from the palatal side at the level of the right premolars and first molar. The graft was sutured in place by means of interrupted sutures (5-0 polyglycolic acid sutures) at the coronal and apical corners. A basting-type of suture was also used, to obtain good adaptation of the graft to the recipient site. A conventional autogenous gingival graft (approximately 1 mm thick) was placed on the prepared recipient site of the second molar and was immobilized with cyanoacrylate. A non-eugenol periodontal dressing was applied to both donor and recipient sites. The patient received routine postsurgical instructions, including a 0.12% chlorhexidine mouth rinse twice daily along with 400 mg ibuprofen 4 times daily for 7 days. One week after the surgical procedure, the patient reported no major problems, although survival problems were evident for the graft over the mesiobuccal root of the first molar (Fig. 2). Healing of the grafted sites was assessed weekly for the first 3 weeks after surgery. At the 12-week evaluation there was a gain in attached gingiva around the first molar, but no root coverage had been achieved at the mesiobuccal root (Fig. 3). The patient had no complaints about the treatment outcome, and oral hygiene was reinforced at this appointment. It was recommended that he proceed with his restorative plan and continue regular periodontal

Table 1 Classification of recession defects proposed by Miller¹⁰

Class of defect	Description
I	Marginal tissue recession does not extend to mucogingival junction No loss of interdental bone or soft tissue
II	Marginal tissue recession extends to or beyond mucogingival junction No loss of interdental bone or soft tissue
III	Marginal tissue recession extends to or beyond mucogingival junction Loss of interdental bone or soft tissue occurs apical to the cemento-enamel junction, but coronal to apical extent of marginal tissue recession
IV	Marginal tissue recession extends beyond mucogingival junction Loss of interdental bone extends to level apical to extent of marginal tissue recession



Figure 1a: Preoperative view of the maxillary right first molar of a 45-year-old man shows a deep, wide recession mesiobuccally (3 mm), with inadequate attached gingiva. Distobuccal recession (2 mm) is also evident, but there is no loss of interdental soft tissue.



Figure 1b: Preoperative radiographic view. There is no loss of interdental bone.

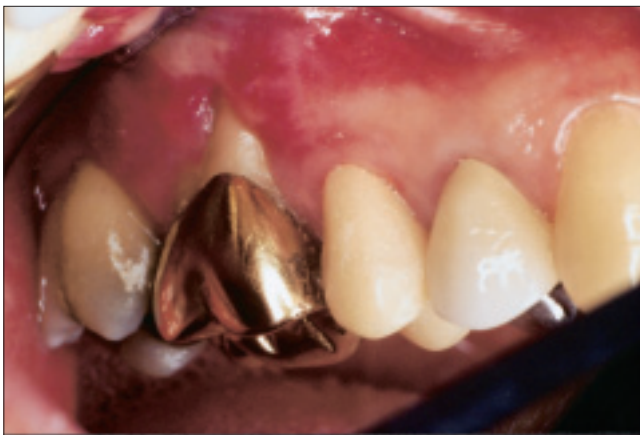


Figure 2: Evaluation 1 week after surgery. A portion of the gingival graft overlying the mesiobuccal root suffered necrosis, and root coverage was not achieved.



Figure 3: Appearance of the site 12 weeks after graft procedure. A gain in attached gingiva is evident, but root coverage of the mesiobuccal root was unsuccessful.



Figure 4a: Treated area 5 years after surgery. Impressive creeping attachment has resulted in complete root coverage.



Figure 4b: The gingiva exhibits resistance to probing and probing depth is minimal.

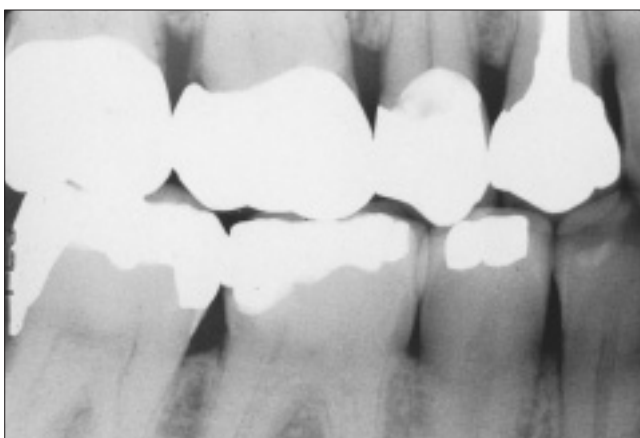


Figure 4c: Radiographic appearance of interproximal bone 5 years after surgery. Bone levels are good. A full-crown restoration has been placed on the second molar. The margins of the crown on the first molar were to be reassessed in the fixed prosthodontic clinic.

maintenance. He was seen at the periodontal clinic a couple of times for maintenance, but no information was recorded about the grafted sites until 5 years after the surgery, when it was noticed that an impressive creeping attachment had

developed, which entirely covered the previously denuded root of the first molar. The marginal tissue felt well attached and probing depth was minimal. A full-crown gold restoration had been placed over the second molar (Figs. 4a and 4b). The patient was referred back to the fixed prosthodontic clinic for assessment of the fractured porcelain at the margin of the crown on the second premolar and for reassessment of the margins of the crown on the first molar (Fig. 4c).

Discussion

Only a few cases of creeping attachment after gingival grafting have been reported in the dental literature and these cases have usually involved unrestored mandibular anterior teeth in young adults.⁶⁻⁸ Only one case has been reported in which bilateral creeping attachment resulted in root coverage of extensive, wide recessions on the maxillary cuspids after autogenous gingival grafting (in a 39-year-old patient).¹¹ Matter and Cimasoni⁶ described 5 factors that seemed to have a definite influence on creeping attachment: width of the recession, position of the graft, interproximal

bone resorption, position of the tooth and the patient's dental hygiene.

The degree of creeping attachment in the patient described here is unique, given the width and length of the recession defect, the tooth type, the presence of a restoration and the patient's age. It is difficult to explain the mechanism that could have caused the coronal migration of tissue, but bridging can be excluded because recession was still present 3 months after the procedure. Citric acid, as advocated by Miller, has been the agent most commonly used for root conditioning in root coverage procedures. A tetracycline hydrochloride solution has also been used.^{12,13} Acid demineralization of the root surface is intended to facilitate formation of a new fibrous attachment, through exposure of collagen fibrils of the cementum or dentin, and to allow subsequent interdigitation of these fibrils with those in the covering connective tissue.¹⁴ However, controlled studies have suggested that there is no clinical benefit of root conditioning with citric acid in conjunction with root coverage procedures.^{15,16} The effect of conditioning the cementum surface with the tetracycline solution and its association with creeping attachment is unknown at this time. Furthermore, histological information to determine the type of attachment is not available.

Creeping attachment typically occurs within 1 to 12 months after the graft surgery.⁷ However, creeping attachment may continue to progress beyond the first post-operative year. Even though it seems to occur whenever there has been an attempt to achieve root coverage with graft surgery, the amount of creeping attachment is unpredictable.¹⁷ Therefore, a well-designed clinical trial, with careful observation of the clinical healing process of autogenous gingival grafts over the long term, is needed to identify factors that could play a significant role in this interesting clinical finding. Such studies might ultimately elucidate the mechanism of creeping attachment. ♦

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References

1. Hall WB. Gingival augmentation/mucogingival surgery. In: Nevins M, Becker W, Kornman K, editors. Proceedings of the World Workshop in Clinical Periodontics; 1989 Jul 23–27; Princeton, New Jersey. Chicago: The American Academy of Periodontology; 1989. VII, p. 5–7.
 2. Björn H. Free transplantation of gingiva propia. *Sver Tandlak Tidsskr* 1963; 22:684.

3. Dorfman HS, Kennedy JE, Bird WC. Longitudinal evaluation of free autogenous gingival grafts. A four year report. *J Periodontol* 1982; 53(6):349–52.
 4. Sullivan HC, Atkins JH. The role of free gingival grafts in periodontal therapy. *Dent Clin North Am* 1969; 13(1):133–48.
 5. Goldman HM, Cohen DW. Periodontal therapy. 5th ed. St. Louis: C.V. Mosby Co.; 1973. p. 715–8.
 6. Matter J, Cimasoni G. Creeping attachment after free gingival grafts. *J Periodontol* 1976; 47(10):574–9.
 7. Matter J. Creeping attachment of free gingival grafts. A five-year follow-up study. *J Periodontol* 1980; 51(12):681–5.
 8. Bell LA, Valluzzo TA, Garnick JJ, Pennel BM. The presence of “creeping attachment” in human gingiva. *J Periodontol* 1978; 49(10):513–7.
 9. Miller PD Jr. Root coverage using a free soft tissue autograft following citric acid application. Part 1: Technique. *Int J Periodontics Restorative Dent* 1982; 2(1):65–70.
 10. Miller PD Jr. A classification of marginal tissue recession. *Int J Periodontics Restorative Dent* 1985; 5(2):9–13.
 11. Pollack RP. Bilateral creeping attachment using free mucosal grafts. A case report with 4-year follow-up. *J Periodontol* 1984; 55(11):670–2.
 12. Harris RJ. The connective tissue with partial thickness double pedicle graft: the results of 100 consecutively-treated defects. *J Periodontol* 1994; 65(5):448–61.
 13. Trombelli L, Schincaglia GP, Zangari F, Griselli A, Scabbia A, Calura G. Effects of tetracycline HCl conditioning and fibrin-fibronectin system application in the treatment of buccal gingival recession with guided tissue regeneration. *J Periodontol* 1995; 66(5):313–20.
 14. Polson AM, Proye MP. Effect of root surface alterations on periodontal healing. II. Citric acid treatment of the denuded root. *J Clin Periodontol* 1982; 9(6):441–54.
 15. Ibbott CG, Oles RD, Laverty WH. Effects of citric acid treatment on autogenous free graft coverage of localized recession. *J Periodontol* 1985; 56(11):662–5.
 16. Bouchard P, Etienne D, Ouhayoun JP, Nilvéus R. Subepithelial connective tissue grafts in the treatment of gingival recessions. A comparative study of 2 procedures. *J Periodontol* 1994; 65(10):929–36.
 17. Harris RJ. Creeping attachment associated with the connective tissue with partial-thickness double pedicle graft. *J Periodontol* 1997; 68(9):890–9.

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Understanding and Managing the Interaction between Sleep and Pain: An Update for the Dentist

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A b s t r a c t

Pain is a symptom well known to disrupt numerous aspects of normal physical and psychological life, including work, social activities and sleep. In daily practice, general dentists and specialists are frequently confronted with issues concerning pain, as their patients seek management that integrates oral health with overall well-being. An example of a dental condition involving pain is temporomandibular disorder, which is one of the most common sources of chronic orofacial pain and which shares similarities with back pain in terms of intensity, persistence and psychosocial impact. The objective of this paper is to inform and aid the general dentist and the specialist concerned with the sleep quality of patients with orofacial pain.

MeSH Key Words: facial pain/complications; sleep/physiology; temporomandibular joint disorders/physiopathology

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Pain disrupts numerous aspects of physical and psychological life, including sleep, and dental problems, such as temporomandibular disorder, are often sources of chronic pain that can alter sleep patterns. The objective of this paper is to inform and aid the general dentist and the specialist concerned with the sleep quality of patients with orofacial pain.

Pain

Pain creates behavioural states that allow the conscious individual to react to noxious threats. It is characterized by the integration of sensory (e.g., intensity), emotional (e.g., unpleasant) and motivational (e.g., running for survival) experiences.¹ The behavioural and cognitive aspects of pain perception are complex; clinicians need to understand this complexity when treating patients who complain of pain. For example, when a clinician asks a patient about pain relief, the patient is invited to compare what he or she is currently feeling with feelings that prompted a prior visit. In addition, a person's memory of

chronic pain is known to increase the intensity of current reported pain, which can complicate a clinician's understanding of the signs and symptoms of pain.²

Diffuse musculoskeletal pain is often associated with complaints of poor sleep and fatigue.³⁻⁶ Brain imaging studies have revealed that "emotional" brain areas (e.g., the cingulate cortex, the prefrontal cortex and the hypothalamus) have a direct role in pain perception and that subjects reporting the most severe pain may have fewer binding sites for brain opioids (e.g., brain morphine, known as endorphin).^{6,7} These observations could account for some of the high variability in measured pain perception and efficacy of analgesics. Moreover, in recent years, the placebo effect has been rediscovered as a powerful factor influencing pain behaviour, pain reporting and use of medication.^{8,9}

Pain is reported by approximately 15% of the general population and by over 50% of older people. With aging, pain perception either remains relatively constant or decreases.^{10,11} Interestingly, even though older patients use more medications (because of an increased prevalence of

various diseases and disorders), in general they are better able to cope with the effect of pain on their quality of life than middle-aged adults.^{12,13} This could be because older patients accept and understand pain as an unpleasant companion of age, whereas younger patients may feel that pain threatens their capacity for life and productivity.

If a conscious person interprets a potentially harmful sensory input as painful, he or she reacts accordingly to protect bodily integrity and physiological homeostasis. In the absence of consciousness (e.g., under general anesthesia or hypnosis and, to a certain degree, during sleep), the brain retains the ability to detect painful input, thereby maintaining some protective reactivity.¹⁴ The processing of pain from the periphery toward the brain, in particular toward the cortex, involves a complex sequence of events. First, specific receptors (e.g., free nerve endings) are activated; then, relay neurons in the spinal cord and thalamus change their firing patterns, and finally, information about the noxious stimulant reaches the sensory motor and emotional brain areas. The autonomic nervous system is also activated when pain is perceived: the heart rate increases, respiration is faster, and sudation is frequently present. A rise in cyclooxygenase 2, commonly recognized in the periphery, has also been observed recently in the spinal cord and brain neurons, which suggests that analgesic medications (e.g., rofecoxib and celecoxib) do not act exclusively in the periphery.^{15,16} More recently, a third cyclooxygenase has been found in the heart and brain, which supports a role for the analgesic acetaminophen.¹⁷

Pain can be either acute and transient or chronic and persistent (more than 1 to 6 months, depending on the condition). Acute pain is common after dental surgery and endodontic treatments. Chronic pain, which can last for years, often affects quality of life and may persist long after an injury has apparently healed. Chronic pain is frequently associated with permanent modifications of central nervous system processes, such as chemical overexpression due to gene induction; lack of enzymatic chemical degradation (e.g., of inflammatory or pain mediators); nerve overactivity associated with aberrant connections (e.g., nerves or cells in the spinal cord that normally respond only to touch now respond to painful stimuli); a damaged dental nerve that sprouts and makes unusual connections to bone, mucosa, periodontal ligament, blood vessels and other tissues.^{15,16}

Sleep

Sleep is a regular process within the 24-hour cycle; humans typically have approximately 16 hours of wakefulness and 8 hours of sleep. Each night's sleep is divided into 2 main types of sleep periods: non-rapid eye movement (REM) periods (which have a sequence of light sleep [stages 1 and 2 non-REM] and deep sleep [stages 3 and 4 non-REM, responsible for restorative function]) and REM periods

(also named paradoxical sleep, characterized by muscle atonia and paralysis). Humans dream during various sleep stages, but the dreams of REM sleep are, in general, more vivid, creative and fantastical. The dreams of patients with chronic pain encompass pain experiences from several body sites, including the head and neck regions.^{18,19} Patients with chronic pain can be encouraged to keep a journal of their dreams (with instruction about avoiding overinterpretation), which may improve their understanding of the causes (e.g., a traumatic event) and consequences (e.g., mood alteration, familial roles, avoidance of social activities) of the pain.

Sleep is a behavioural and physiological state that is generally resistant to nonmeaningful external stimuli.²⁰ In the general population, the proportion of people reporting insomnia (either a long delay in sleep onset or no return to sleep if awakened) increases from 20% among people 15 to 24 years of age to 36% after the age of 75. Anxiety is an important factor in insomnia and poor sleep,^{21,22} and patients with chronic pain are at high risk of insomnia.²²⁻²⁴

In most (50% to 90%) patients with acute pain, the occurrence of pain generally precedes complaints of poor sleep.^{22,24} However, studies of patients with burn pain or chronic pain have indicated bidirectional influences: a night of poor sleep may be followed by greater pain the next day, and a day with high pain levels is often followed by a night of poor sleep.^{25,26}

In general, the percentage of time spent in each sleep stage is not markedly different between patients with chronic pain and control subjects. However, in patients with chronic pain and other poor sleepers, sleep is often more fragmented than that of "normal" healthy adults (i.e., the overall sleep period is broken down into several brief periods of sleep). This fragmented sleep is characterized by subtle changes, including frequent micro-arousals (3 to 10 seconds long, involving transient brain, heart and muscle activations), awakenings (activations lasting longer than 10 to 15 seconds, with possible consciousness), shifts in sleep stage (e.g., from a deeper to a lighter sleep stage) or body movements (or some combination of these characteristics). These subtle changes may occur in clusters, repeating every 20 to 40 seconds, accompanied by rapid alpha cortical waves (known as alpha wave intrusions) and increases in heart rate and muscle tone. These changes are collectively termed cyclic alternating pattern (CAP), and when CAP occurs too frequently, it can lead to poor sleep.^{27,28} Interestingly, a recent report indicates that patients with fibromyalgia do not display the reduction in heart rate that is usually observed during the deeper restorative sleep stages (i.e., stages 3 and 4 of non-REM sleep).²⁹ Thus, if the brain is overactive during sleep (i.e., an excessive frequency of CAP), with heart rate remaining at daytime levels, sleep could be nonrefreshing. This might

account for complaints of poor sleep, daytime fatigue, lack of concentration, memory dysfunction and increased risk of motor vehicle crashes and workplace accidents.³⁰⁻³³ These findings might also explain the interrelationship between poor sleep and other manifestations of pain, including fatigue and irritability. These observations merit consideration when planning both basic research and clinical assessments of pain management strategies.

The pain perceived during an unconscious or unresponsive state, such as sleep or general anesthesia, is termed nociception.³⁴ During sleep, nociception remains active to protect bodily integrity. In light sleep (stages 1 and 2 non-REM) and in REM sleep, the body can react rapidly to meaningful external stimuli (e.g., the sound of a telephone, an alarm or a crying baby).^{35,36} However, in deep sleep (stages 3 and 4 non-REM), this responsiveness is partially suppressed to protect sleep continuity. To better understand how the brain processes sensory pain information, the authors used young, healthy subjects in a laboratory setting to compare intramuscular injection of noxious hypertonic saline solutions with injection of non-noxious solutions and vibrotactile stimulation during sleep. Patients experiencing pain were not included in these studies since it would have been difficult to isolate sleep fragmentation variables from the influence of medications, mood alteration, poor sleep and other factors. The results revealed that experimental pain stimulations triggered awakenings and shifts in sleep stage over all sleep stages, including the usually less responsive deep sleep and REM sleep.³⁷ This novel finding suggests that management strategies should focus on all sleep stages to maintain the best sleep quality. Additional studies are now underway to determine whether these responses explain the poor sleep, fatigue (e.g., low restorative effect) and lower cognitive function reported by patients with chronic pain.³⁸

Clinical Guidelines

The assessment and treatment of sleep problems among patients with chronic pain can be approached in 4 steps (see below and **Table 1**). Management of pain and sleep may include the use of behavioural strategies with or without medications that improve sleep by reducing microarousal or CAP activation and thereby decrease persistent autonomic-cardiac activation (e.g., strategies that improve the parasympathetic drive during deep sleep). Because a higher quality of life is important for all patients, it is considered necessary to prevent the effects of sleepiness on important cognitive functions (e.g., memory and driving). This paper does not address the use of oral splint appliances and physical therapy in the management of orofacial pain; reviews of these subjects can be found elsewhere.^{39,40}

Step 1: Evaluation for Primary Sleep Disorder

Before pharmacological approaches are considered, it is important to obtain a complete history of the patient's sleep habits and to determine if he or she has a primary sleep disorder (e.g., a disorder that affects breathing, such as snoring or apnea, periodic limb movement syndrome, sleep bruxism or insomnia). For this, a screening questionnaire⁴¹ can be invaluable. If a primary sleep disorder is suspected, the patient needs to consult the family physician for possible referral to a sleep centre.

Steps 2 and 3: Sleep Hygiene and Behavioural and Cognitive Strategies

If a primary sleep disorder is not suspected, the patient's sleep hygiene is then reviewed. This review includes questions about the sleep environment, such as whether a baby sleeps in the same bedroom, whether the bedroom is also used as an office (with or without a computer) and the level of outside traffic noise. For optimal sleep, the bedroom should be a quiet "oasis," not an area for work and negotiation. The patient should be asked whether he or she has a regular daily schedule (i.e., a regular 24-hour sleep-wake cycle on both weekdays and weekends). Furthermore, lifestyle issues should be assessed, including evening habits (e.g., caffeine intake, smoking, alcohol consumption or intense exercise late in the evening); such habits are to be discouraged, since this time should be reserved for relaxing before sleep.

Several well-defined behavioural and relaxation methods are available for stress management in relation to the interaction of sleep and pain.⁴²⁻⁴⁴ These techniques include progressive muscle relaxation (sequential relaxation of major muscle groups), meditation, imagery training and hypnosis. Although relaxation techniques differ in philosophical approach, they share 2 main components: repetition of a specific activity, such as words, sounds, prayers, phrases, body sensations or muscular activity; and a passive attitude toward intruding thoughts, which should result in a return of focus. These techniques are intended to induce a common set of physiological changes, such as decreased metabolic activity, heart rate and muscle tone.

Relaxation methods require training motivation and daily practice, but the patient can anticipate long-term effects if compliant. Professional guidance from a psychologist or a physical therapist is often necessary during the initial stages of treatment to help patients master the selected technique.

Meditation techniques do not involve suggestion; rather, the individual is trained to passively attend to a bodily process, a word or a stimulus. The goal of "mindful meditation" is the development of nonjudgemental awareness of bodily sensations and mental activities occurring in the present moment.

Table 1 Essential sleep management issues to be addressed in patients with orofacial pain

Step of assessment and treatment	Comments
Step 1 Evaluation for primary sleep disorder	Examples: insomnia, sleep-disordered breathing, primary snoring, daytime fatigue or sleepiness Consult physician if necessary
Step 2 Review of sleep hygiene	Evaluate: <ul style="list-style-type: none"> • Sleep environment (e.g., bedroom dark, cool and quiet) • Wake-sleep cycle (e.g., consistent bedtime and morning awakening) • Lifestyle habits (e.g., intense exercise, smoking or alcohol intake at night)
Step 3 ^a Behavioural and cognitive strategies	Examples: establish regular routines for evening relaxation, avoid intense or troubling evening discussions
Step 4 ^{a,b} Pharmacological interventions ^c	<p>Short-term therapy Analgesic, either alone or combined with a muscle relaxant, administered in the evening:</p> <ul style="list-style-type: none"> • ibuprofen (Advil, Motrin), acetylsalicylic acid (ASA; Aspirin) or acetaminophen (Tylenol) • acetaminophen with chlorzoxazone (Tylenol Aches and Strains) • methocarbamol with either acetaminophen (Robaxacet) or ASA (Robaxisal) <hr/> <p>Mild condition <i>Muscle relaxant or sedative (in early evening, to reduce morning dizziness)</i></p> <ul style="list-style-type: none"> • low-dose cyclobenzaprine (Flexeril, half or full 10-mg tablet) • clonazepam (Rivotril 0.5 mg short term because of risk dependence) • analgesics such as acetaminophen, ibuprofen or ASA can be taken with cyclobenzaprine and clonazepam if the pain is too great <hr/> <p><i>Sleep facilitator</i></p> <ul style="list-style-type: none"> • triazolam (Halcion 0.125 to 0.250 mg) • temazepam (Restoril 10 to 20 mg) • zopiclone (Imovane 5 to 7.5 mg) • zolpidem (Ambien 5 to 10 mg): not currently available in Canada • zaleplon (Starnoc, 10 to 20 mg)^d — very short acting, useful for middle of the night or late-night wakefulness or insomnia <hr/> <p>More severe or persistent cases (physician consultation recommended)</p> <ul style="list-style-type: none"> • low-dose amitriptyline (Elavil 5 to 50 mg, in increasing doses if required) in the evening • trazodone (Desyrel 150 mg) • nefazodone (Serzone) • gabapentin (Neurontin), codeine (Codeine Contin) + morphine (MS Contin) <hr/> <p>Others:</p> <ul style="list-style-type: none"> • valerian • lavender • glucosamine sulphate • kava

^aFor steps 3 and 4, combined strategies could be considered but only on a case-by-case basis.

^bPatients should be forewarned of potential side effects associated with the medications listed; these may include daytime sleepiness and dizziness. Patients should avoid driving in the morning and they should use caution in operating any potentially hazardous tool.

^cBrand names are included only as examples and not to promote any one product. The manufacturers are as follows: Advil, Whitehall-Robins; Motrin, McNeil Consumer Healthcare; Aspirin, Bayer Consumer; Tylenol and Tylenol Aches and Strains, McNeil Consumer Healthcare; Robaxacet and Robaxisal, Whitehall-Robins; Flexeril, Alza; Rivotril, Roche; Halcion, Pharmacia; Restoril, Novartis Pharmaceuticals; Imovane, Aventis Pharma; Ambien, Sanofi-Synthelabo Inc.; Starnoc, Servier; Elavil, Merck Frosst; Desyrel, Bristol; Serzone, Bristol-Myers Squibb; Neurontin, Pfizer; Codeine Contin and MS Contin, Purdue Pharma.

^dIdeal for patients with sleep apnea.

Medical hypnotic techniques induce a state of selective attention in which the subject isolates himself or herself from his or her thoughts. It is often combined with enhanced imagery. Patients may also learn autohypnosis, a relaxation technique in which thinking is directed toward pleasant images. People vary widely in their “hypnotic susceptibility” and “suggestibility,” although the reasons for these differences are not clearly understood.

Stimulus Control and Sleep Hygiene

Improvement of sleep quality through changes in sleep hygiene proves beneficial for many patients. For example,

the patient may be instructed to go to bed only when sleepy, to get out of bed when unable to sleep, to rise at the same time every morning and to take only brief naps during the day (20 to 30 minutes or less before 3 p.m. is thought to not significantly alter nighttime sleep). Patients should avoid caffeinated beverages after dinner and smoking around bedtime and upon nighttime waking, and should either reduce or avoid alcohol consumption in the evening. Patients should also avoid intense exercise before bedtime and should minimize bedroom noise, light and extreme temperatures.⁴⁵

Cognitive Strategies

Cognitive-behavioural therapy attempts to reorient patterns of negative thoughts and dysfunctional attitudes toward a focus on healthy adaptive thoughts, emotions and actions. Patients must be reminded to keep expectations realistic and to avoid blaming insomnia for all of life's difficulties. In addition, patients should avoid catastrophic attitudes (exaggerated negative orientation toward experiences) after a poor night's sleep.⁴⁶

Step 4: Pharmacological Interventions

If poor sleep persists during or after institution of steps 1 to 3, the dentist, in consultation with a physician, may consider pharmacotherapy.

Pharmacological Strategies for Short-Term and Mild Conditions

Among the pharmacological agents available, analgesics alone or in combination with a mild muscle relaxant, administered in the evening, can be tried (see Table 1). A low dose of cyclobenzaprine or clonazepam, taken in the evening, either alone or with an analgesic (e.g., acetaminophen or ibuprofen), may promote muscle relaxation, reduce pain and produce light sedation. Sleep facilitators, such as zaleplon, triazolam, temazepam and zopiclone, may also prove helpful for short periods, but they are not recommended in very young or older patients. In the presence of sleep-disordered breathing (e.g., sleep apnea), zaleplon or zopiclone is preferred. For refractory cases, physicians may prescribe low-dose amitriptyline (with slowly increasing doses), trazodone or nefazodone before sleep. These medications may have the secondary effect of improving mood and altering the experience of pain. Gabapentin, codeine and morphine are sometimes used for severe pain, but these drugs are known to interfere with sleep quality. Caution is advised in prescribing selective serotonin reuptake inhibitors such as fluoxetine, sertraline, and paroxetine, since these medications can trigger or aggravate movement during sleep, including periodic limb movement and sleep bruxism. The use of cardioactive medications for pain management (e.g., propranolol) is associated with increased risk of sleep apnea and nightmares.⁴⁷

"Natural" and Herbal Products

Herbal medicines are widely used in the treatment of pain and to aid sleep, but most lack evidence to support these uses. Examples include St. John's wort (for depression), valerian (for sedation and sleep),^{48,49} lavender (for sleep),^{49,50} kava (for anxiety and sleep),⁵¹ glucosamine sulfate (for arthritis)^{52,53} and even cannabis. Nonetheless, given their growing popularity, dentists should ask patients whether they are using any of these products before contemplating the prescription of a more conventional medication that might have an additive sedative action or

that might cause an adverse drug interaction.⁴⁸ Most natural medicines have the potential to produce interaction effects with conventional medications.

Conclusions

Dentists play an important role in relieving orofacial pain and are front-line managers of temporary sleep disturbances associated with pain.⁴¹ Given the increasing popularity of herbal and other alternative medicines, the risks of adverse interactions with more conventional medications need to be assessed for each patient. Three Web sites are suggested as sources of additional information: Saskatoon Health Region (www.sdh.sk.ca), National Center for Complementary and Alternative Medicine (www.nccam.nih.gov) and Réseau Proteus (www.reseauproteus.net/1001solutions). ♦

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References

1. Price DD. Psychological and neural mechanisms of the affective dimension of pain. *Science* 2000; 288(5472):1769–72.
2. Feine JS, Lavigne GJ, Dao TT, Morin C, Lund JP. Memories of chronic pain and perception of relief. *Pain* 1998; 77(2):137–41.
3. Craig JC, Rollman GB. Somesthesia. *Annu Rev Psychol* 1999; 50:305–31.
4. Kosek E, Hansson P. Modulatory influence on somatosensory perception from vibration and heterotopic noxious conditioning stimulation (HNCS) in fibromyalgia patients and healthy subjects. *Pain* 1997; 70(1):41–51.
5. Washington LL, Gibson SJ, Helme RD. Age-related differences in the endogenous analgesic response to repeated cold water immersion in human volunteers. *Pain* 2000; 89(1):89–96.
6. Edwards RR, Fillingim RB. Effects of age on temporal summation and habituation of thermal pain: clinical relevance in healthy older and younger adults. *J Pain* 2001; 2(6):307–17.
7. Zubieta JK, Smith YR, Bueller JA, Xu Y, Kilbourn MR, Jewett DM, and others. Regional Mu opioid receptor regulation of sensory and affective dimensions of pain. *Science* 2001; 293(5528):311–5.

8. Pollo A, Amanzio M, Arslanian A, Casadio C, Maggi G, Benedetti F. Response expectancies in placebo analgesia and their clinical relevance. *Pain* 2001; 93(1):77-84.
9. Kleinman A, Guess HA, Wilentz JS. An overview. In: Guess HA, Kleinman A, Kusek JW, Engel LW, editors. The science of the placebo toward an interdisciplinary research agenda. London: BMJ; 2002. p. 1-32.
10. Meh D, Denislic M. Quantitative assessment of thermal and pain sensitivity. *J Neurol Sci* 1994; 127(2):164-9.
11. Kaasalainen S, Molloy W. Pain and aging. *J Can Geriatr Soc* 2001(Feb):32-7.
12. Harkins SW, Price DD, and Martelli M. Effects of age on pain perception: thermonociception. *J Gerontol* 1986; 41(1):58-63.
13. Riley JL, Wade JB, Robinson ME, Price DD. The stages of pain processing across the adult lifespan. *J Pain* 2000; 1(2):162-70.
14. Lavigne GJ, Brousseau M, Montplaisir J, Mayer P. Pain and sleep disturbances. In: Lund JP, Lavigne GJ, Dubner R, Sessle BJ, editors. Orofacial pain: from basic science to clinical management. Illinois: Quintessence; 2001. p. 139-50.
15. Julius D, Basbaum AI. Molecular mechanisms of nociception. *Nature* 2001; 413:203-10.
16. Woolf CJ, Salter MW. Neuronal plasticity: increasing the gain in pain. *Science* 2000; 288(5472):1765-9.
17. Chandrasekharan NV, Dai H, Roos KL, Evanson NK, Tomsik J, Elton TS, and other. COX-3, a cyclooxygenase-1 variant inhibited by acetaminophen and other analgesic/antipyretic drugs: cloning, structure, and expression. *Proc Natl Acad Sci USA* 2002; 99(21):13926-31.
18. Zadra AL, Nielsen TA, Germain A, Lavigne GJ, Dondeni DC. The nature and prevalence of pain in dreams. *Pain Res Manage* 1998; 3(3):155-61.
19. Raymond I, Nielsen TA, Lavigne GJ, Choinière M. Incorporation of pain in dreams of hospitalized burn victims. *Sleep* 2002; 25(7):765-70.
20. Carskadon MA, Dement WC. Normal human sleep: an overview. In: Kryger MH, Roth T, Dement WC, editors. Principles and practice of sleep medicine. 3rd ed. Philadelphia: W.B. Saunders Co.; 2000. p. 15-25.
21. Moldofsky H. Sleep and pain. *Sleep Med Rev* 2001; 5(5):387-96.
22. Morin CM, Gibson D, Wade J. Self-reported sleep and mood disturbance in chronic pain patients. *Clin J Pain* 1998; 14(4):311-4.
23. Sutton DA, Moldofsky H, Badley EM. Insomnia and health problems in Canadians. *Sleep* 2001; 24(6):665-70.
24. Smith MT, Perlis ML, Smith MS, Giles DE, Carmody TP. Sleep quality and presleep arousal in chronic pain. *J Behav Med* 2000; 23(1):1-13.
25. Affleck G, Urrows S, Tennen H, Higgins P, Abeles M. Sequential daily relations of sleep, pain intensity, and attention to pain among women with fibromyalgia. *Pain* 1996; 68(2-3):363-8.
26. Raymond I, Nielsen TA, Lavigne GJ, Manzini C, Choinière M. Quality of sleep and its daily relationship to pain intensity in hospitalized adult burn patients. *Pain* 2001; 92(3):381-8.
27. Terzano MG, Parrino L, Smerieri A, Chervin R, Chokroverty S, Guilleminault C, and others. Atlas, rules, and recording techniques for the scoring of cyclic alternating pattern (CAP) in human sleep. *Sleep Med* 2001; 2:537-53.
28. Parrino L, Smerieri A, Rossi M, Terzano MG. Relationship of slow and rapid EEG components of CAP to ASDA arousals in normal sleep. *Sleep* 2001; 24(8):881-5.
29. Martínez-Lavín M, Hermsillo AG, Rosas M, Soto M-E. Circadian studies of autonomic nervous balance in patients with fibromyalgia: a heart rate variability analysis. *Arthritis Rheum* 1998; 41(11):1966-71.
30. Mahowald ML, Mahowald MW. Nighttime sleep and daytime functioning (sleepiness and fatigue) in well-defined chronic rheumatic diseases. *Sleep Medicine* 2000; 1(3):179-93.
31. Kewman DG, Vaishampayan N, Zald D, Han B. Cognitive impairment in musculoskeletal pain patients. *Int J Psychiatry Med* 1991; 21(3):253-62.
32. Côté KA, Moldofsky H. Sleep, daytime symptoms, and cognitive performance in patients with fibromyalgia. *J Rheumatol* 1997; 24(10):2014-23.
33. Grace GM, Nielson WR, Hopkins M, Berg MA. Concentration and memory deficits in patients with fibromyalgia syndrome. *J Clin Exp Neuropsychol* 1999; 21(4):477-87.
34. Bromm B. Consciousness, pain, and cortical activity. In: Bromm B, Desmedt JE, editors. Pain and the brain: from nociception to cognition. New-York: Raven Press; 1995. p. 35-59.
35. Langford GW, Meddis R, Pearson AJ. Awakening latency from sleep for meaningful and non-meaningful stimuli. *Psychophysiology* 1974; 11(1):1-5.
36. Perrin F, García-Larrea L, Maugière F, Bastuji H. A differential brain response to the subject's own name persists during sleep. *Clin Neurophysiol* 1999; 110(12):2153-64.
37. Brousseau M, Kato T, Mayer P, Manzini C, Guitard F, Montplaisir J. Effect of experimental innocuous and noxious stimuli on sleep for normal subjects. *IASP Abstr* 2002; 10:498-No.1491.
38. Bonnet MH. Sleep deprivation. In: Kryger MH, Roth T, Dement WC, editors. Principles and practice of sleep medicine. 3rd ed. Philadelphia: W.B. Saunders; 2000. p. 53-71.
39. Dao TT, Lavigne GJ. Oral splints: the crutches for temporomandibular disorders and bruxism? *Crit Rev Oral Biol Med* 1998; 9(3):345-61.
40. Feine JS, Lund JP. An assessment of the efficacy of physical therapy and physical modalities for the control of chronic musculoskeletal pain. *Pain* 1997; 71(1):5-23.
41. Lavigne GJ, Goulet JP, Zucconi M, Morrison F, Lobbezoo F. Sleep disorders and the dental patients: an overview. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999; 88(3):257-72.
42. NIH technology assessment panel. Integration of behavioral and relaxation approaches into the treatment of chronic pain and insomnia. *JAMA* 1996; 276(4):313-8.
43. Stepanski EJ. Behavioral therapy for insomnia. In: Kryger MH, Roth T, Dement WC, editors. Principles and practice of sleep medicine. 3rd ed. Philadelphia: W.B. Saunders Co.; 2000. p. 647-56.
44. Morin CM, Blais F, Savard J. Are changes in beliefs and attitudes about sleep related to sleep improvements in the treatment of insomnia? *Behav Res Ther* 2002; 40(7):741-52.
45. Zarcone VP. Sleep hygiene. In: Kryger MH, Roth T, Dement WC, editors. Principles and practice of sleep medicine. 3rd ed. Philadelphia: Saunders, W.B. Co.; 2000. p. 657-61.
46. Sullivan MJ, Stanish W, Waite H, Sullivan M, Tripp DA. Catastrophizing, pain, and disability in patients with soft-tissue injuries. *Pain* 1998; 77(3):253-60.
47. Lavigne GJ, Manzini C. Sleep bruxism and concomitant motor activity. In: Kryger MH, Roth T, Dement WC, editors. Principles and practice of sleep medicine. 3rd ed. Philadelphia: W.B. Saunders; 2000. p. 773-85.
48. Gyllenhaal C, Merritt SL, Peterson SD, Block KI, Gochenour T. Efficacy and safety of herbal stimulants and sedatives in sleep disorders. *Sleep Med Rev* 2000; 4(3):229-51.
49. Schultz V, Hansel R, Tyler VE. Rationale phototherapy. Berlin: Springer; 1998.
50. Buchbauer G, Jirovetz L, Jager W. Aromatherapy: evidence for sedative effects of lavender oil. *Bull Inst Physiol* 1970; 8:69-76.
51. Lehmann E, Klieser E, Klimke A, Krach H, Spatz R. The efficacy of Cavain in patients suffering from anxiety. *Pharmacopsychiatry* 1989; 22(6):258-62.
52. Parkman CA. Alternative therapies for osteoarthritis. *Case Manager* 2001; 12(3):34-6.
53. Thie NM, Prasad NG, Major PW. Evaluation of glucosamine sulfate compared to ibuprofen for the treatment of temporomandibular joint osteoarthritis: a randomized double blind controlled 3 month clinical trial. *J Rheumatol* 2001; 28(6):1347-55.

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IN COOPERATION

Effect of Illumination on the Accuracy of Identifying Interproximal Carious Lesions on Bitewing Radiographs

• Paul Deep, BSc, MSc, DMD •
• Demetrios Petropoulos, BSc, MSc, DMD •

A b s t r a c t

Background: Dentists generally use a viewbox as the primary source of illumination when examining radiographs. Secondary sources of illumination (i.e., light other than that originating from the viewbox) can reduce radiographic contrast and may therefore affect diagnostic accuracy.

Objective: To determine if the accuracy of identifying interproximal carious lesions on bitewing radiographs depends on the level of secondary illumination.

Methods: Fourteen dentists examined bitewing radiographs of simulated interproximal lesions on dentition phantoms in conditions of maximal secondary illumination (the light condition) and minimal secondary illumination (the dark condition).

Results: There was no significant difference ($p = 0.07$) in the accuracy of identifying simulated interproximal carious lesions on bitewing radiographs in the light (mean accuracy $72\% \pm 12\%$) and dark ($75\% \pm 12\%$) conditions.

Clinical Significance: Examining bitewing radiographs on a viewbox located in the operatory is adequate for accurately identifying interproximal carious lesions.

MeSH Key Words: dental caries/radiography; lighting; observer variation

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The accurate diagnosis and treatment of dental caries remain integral components of general dental practice. Carious lesions on the interproximal (i.e., mesial and distal) surfaces of teeth often go undetected with simple visual inspection. In such cases, caries information that is not clinically evident is best obtained via radiography, specifically bitewing radiographs.¹

The standard technique for examining radiographs is to place the image on a viewbox, which illuminates the anatomic structures by shining light directly through the radiograph. The viewbox thus acts as the primary source of illumination. Secondary sources of illumination (i.e., light other than that originating from the viewbox), such as overhead indoor light or natural outdoor light, can reduce the radiographic contrast and may therefore affect the viewer's ability to extract accurate diagnostic information.

The purpose of this study was to determine if the accuracy of identifying interproximal carious lesions on bitewing radiographs depends on the level of secondary illumination. Two conditions were investigated: the light condition, in which secondary illumination of radiographs was maximized, and the dark condition, in which secondary illumination was minimized. On the basis of the results obtained, recommendations for examining patient radiographs are made.

Materials and Methods

Caries Model

A series of 10 dentition phantoms, with accompanying bitewing radiographs, served as the basis for the study; the models had been constructed and radiographed previously for a separate study, as described in detail elsewhere.²

Briefly, 60 extracted human teeth (40 premolars and 20 molars) were visually inspected and verified to be free of carious lesions. The teeth were arranged in plaster blocks to simulate 10 maxillary left quadrants and 10 mandibular left quadrants, which were then joined to form 10 left dentition phantoms. Each phantom contained 10 interproximal surfaces available for study: the mesial and distal aspects of the first and second premolars and the mesial aspect of the first molars, for a total of 100 surfaces. Simulated interproximal carious lesions were created by randomly drilling holes with plain carbide burs (1/4 or 1/2 round) on 64 of the 100 available surfaces at the point of contact; the depth of each hole was less than or equal to the depth of the bur. One bitewing radiograph of each phantom was obtained with Kodak Ultraspeed dental film (Eastman Kodak Corporation, Rochester, New York); the Trophy 70-X intraoral x-ray unit was operated at 70 kVp and 8 mA, a 0.7×0.7 mm focal spot was used, and total filtration was 2.5 mm aluminium equivalent. All radiographs were processed in the same session, for which fresh chemicals were used; an unexposed film was processed before and after the series of exposed films to ensure equivalent densities.

Viewing Conditions

The primary source of illumination for the examination of radiographs was a portable viewbox (operating at 110 V, 60 Hz and 0.18 A).

For the light condition, sources of secondary illumination were maximized as follows:

- The radiographs were mounted in a clear (lucent) plastic frame.
- The viewbox was placed adjacent to a window during peak daylight hours (12:00 noon to 1:00 p.m.).
- All overhead lights were switched on.
- The door to the room was kept open.

For the dark condition, sources of secondary illumination were minimized as follows:

- The radiographs were mounted in an opaque plastic frame.
- The viewbox was placed in a room without windows (the darkroom).
- All overhead lights were switched off.
- The door to the room was kept closed.

Instructions to Participants

Fourteen dentists, all general practitioners, volunteered to examine the bitewing radiographs on 2 separate occasions: first in the light condition and subsequently in the dark condition, with a minimum interval of 1 week between the examinations. Dental specialists were excluded

from the study group to minimize heterogeneity of caries diagnostic ability.

The participants were instructed to identify all simulated interproximal carious lesions, irrespective of size. A time limit of 10 minutes was imposed for each radiographic examination, to mimic actual clinical conditions and prevent unrealistically zealous scrutiny of the radiographs.

Data Analysis

The accuracy of identifying simulated interproximal carious lesions (as a percentage) was determined for each examination; mean values (with standard deviation) were then calculated for the light and dark conditions. Student's *t*-test (paired, 2-sided) was used to identify a significant effect of secondary illumination on mean estimates of accuracy. A probability value (*p*) less than 0.05 was considered statistically significant.

Results

There was no significant difference ($p = 0.07$) in the accuracy of identifying simulated interproximal carious lesions on bitewing radiographs in the light condition ($72\% \pm 12\%$, range 52% to 86%) and the dark condition ($75\% \pm 12\%$, range 48% to 92%). Overall, 4 of the 14 observers displayed greater accuracy in the light condition, 8 displayed greater accuracy in the dark condition, and 2 displayed equal accuracy in the 2 viewing conditions.

Discussion

Minimizing sources of secondary illumination by using an opaque (instead of lucent) plastic frame to mount radiographs, reducing exposure to natural outdoor light and reducing exposure to artificial indoor light did not affect the accuracy of identifying simulated interproximal carious lesions on bitewing radiographs of extracted human teeth.

The following points are also of interest:

- Only 8 (57%) of the participants displayed greater accuracy in the dark condition than in the light condition.
- The lowest (48%) and highest (92%) individual estimates of accuracy in the dark condition were almost identical with the corresponding estimates in the light condition (52% and 86%, respectively).

Taken together, these observations suggest that there are no clinical benefits to controlled darkroom viewing for the radiographic identification of interproximal carious lesions. Furthermore, the present findings are consistent with those of a similar study,³ in which the level of background lighting did not affect observers' ability to radiographically detect simulated interproximal carious lesions.

This study had several limitations. First, the sample size was relatively low; the precision of the results would be improved with a greater number of participants. Second, the effect of frame opacity on estimates of accuracy was not

investigated. To establish the influence of this variable, it would have been necessary to test the 2 frame types (lucent and opaque) in both the light and the dark conditions. Third, the results were biased by the fact that simulated interproximal carious lesions do not exactly mimic naturally occurring lesions. However, as explained by Dagenais and Clark²: "Although we are aware that drilled holes have limitations in terms of simulation of dental caries ... the attributes of uniformity of shape and size have advantages in terms of the statistical analysis." This argument is invoked as the basis for extrapolation of the present results to real carious lesions on human teeth in vivo.

The importance of strong primary illumination in dental radiology has been confirmed experimentally: a pair of studies found that use of a viewbox yields higher diagnostic quality than room lighting alone.^{4,5} Indeed, dentists generally examine radiographs on a viewbox installed in the operatory. It is suggested that this viewing condition, even in the presence of high levels of secondary illumination (e.g., strong overhead lighting or natural daylight) is adequate for accurately identifying interproximal carious lesions on bitewing radiographs. ♦

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References

1. Kidd EA, Pitts NB. A reappraisal of the value of the bitewing radiograph in the diagnosis of posterior approximal caries. *Br Dent J* 1990; 169(7):195–200.
2. Dagenais ME, Clark BG. Receiver operating characteristics of RadioVisioGraphy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1995; 79(2):238–45.
3. Cederberg RA, Frederiksen NL, Benson BW, Shulman JD. Effect of different background lighting conditions on diagnostic performance of digital and film images. *Dentomaxillofac Radiol* 1998; 27(5):293–7.
4. Espelid I. The influence of viewing conditions on observer performance in dental radiology. *Acta Odontol Scand* 1987; 45(3):153–61.
5. Patel N, Rushton VE, Macfarlane TV, Horner K. The influence of viewing conditions on radiological diagnosis of periapical inflammation. *Br Dent J* 2000; 189(1):40–2.

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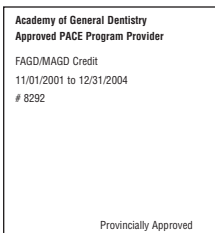
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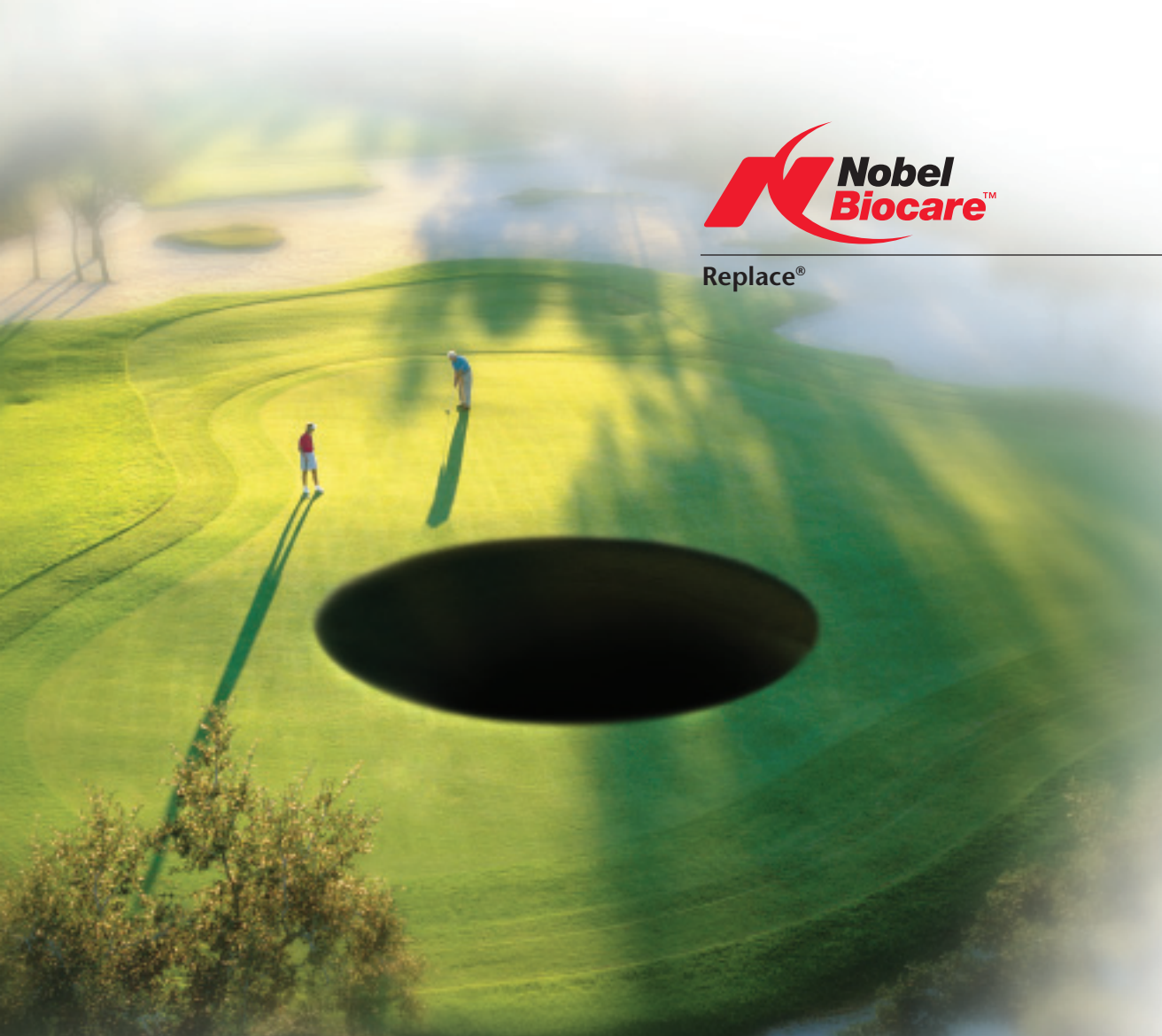
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CAOMR Challenge No. 10

Ernest W.N. Lam, DMD, PhD, FRCD(C)

A 47-year-old woman was seen for nonspecific pain on the left side of the face and in the temporomandibular region. Her medical history was noncontributory. Clinical examination revealed palpable pain in the left maxilla and temporomandibular joint areas, as well as trismus. Vitality testing of the maxillary teeth indicated the left second molar was vital. The maxillary left second premolar and first molar had been endodontically treated. The patient was subsequently referred to an oral and maxillofacial radiologist for evaluation.

A pantomograph (not shown) depicted a well-defined, corticated, "hydraulic" radiopaque mass in the centre of the patient's left maxilla. The patient underwent a cone-beam computed tomography (CT) examination. A thorough

review of the complete CT image set failed to identify any radiographic evidence of degenerative temporomandibular joint disease. **Figure 1** is a panoramic reconstruction from the cone-beam CT examination, showing the mass in the left maxilla. The mass had displaced the floor of the left maxillary sinus superiorly; the border of the maxilla was displaced posteriorly. As well, the enlarged left maxilla impinged on the left temporal fossa space posteriorly and laterally. The coronal reconstruction of the image data (**Fig. 2**) showed substantial thinning of the lateral wall of the maxilla and bowing of the hard palate. Sagittal reconstruction (**Fig. 3**) showed the association of the mass with the maxillary left first and second molar teeth.



Figure 1



Figure 2



Figure 3

What is your interpretation of the radiographic images?

(See page 450 for answer)

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2. *Am J Dent.* 2001;14:273-277 (CrossAction vs Crest[®] SpinBrush[™]).
3. *Am J Dent.* 2001;14(Sp Iss):19B-24B (CrossAction vs Colgate[®] Actibrush[™]).
4. Data on file (CrossAction vs Colgate Motion[™]).

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Answer to CAOMR Challenge No. 10

It is important to note the radiopacity of the mass compared with the radiolucency of the maxillary sinus. Because an abnormality is radiopaque does not automatically mean that it is bone, or bone-producing. As radiolucency and radiopacity are relative terms, any object adjacent to an air-filled space such as a sinus would appear radiopaque.

As a first step in interpreting the radiographs, it is important to determine the anatomic compartment from which the mass arises. The identification of a cortex surrounding the mass, as well as remnant air space in the sinus, suggests that the mass arises from outside of the sinus. Mass lesions arising from within the sinus, such as mucous retention pseudocysts or antral polyps, will not have a corticated border. A maxillary sinus mucocele will

result in a substantial thinning of the sinus border and enlargement of the bone. But because mucoceles are completely filled with fluid secretions, no air space is seen.

Differential diagnosis includes radicular cyst, odontogenic keratocyst and unicystic ameloblastoma.

The patient was referred for an excisional biopsy. The results identified the mass as a radicular cyst. ♦

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Clinical Abstracts

The Clinical Abstracts section of JCDA features abstracts and summaries from peer-reviewed dental publications. It attempts to make readers aware of recent literature that may be of interest to oral health care workers. It is not intended to provide a systematic review of the topic. This month's selection provides an update on posterior resin composite restorations. The articles were chosen by Dr. Richard Price, a professor in the department of dental clinical sciences at Dalhousie University, Halifax, Nova Scotia. A commentary is provided that puts these articles into context for readers.

Commentary

What Should Dentists Tell Their Patients about Posterior Resin Composite Restorations?

Richard Price, BDS, DDS, MS, FRCD(C), PhD

Sometimes scientific evidence does not support clinical practice. This may be the case for the widespread use of posterior composites. A survey by the Health Policy Resources Center of the American Dental Association reported that the number of amalgam restorations placed annually in the United States was declining and that more than 46 million posterior composite resin restorations had been placed in 1999. Although there may be global benefits from eliminating mercury from the dental office, this comes at a cost. On the basis of insurance claims, Bogacki and others (see abstract 1) reported that a restoration had a significantly greater chance of failure if it was a resin composite. Hondrum (abstract 2) reported that posterior composite resins have a median life expectancy of 5 years, with a range of 3 to 9 years. If this is correct, then by 2004 at least 23 million of the 46 million restorations placed in 1999 will need to be replaced.

Tobi and others (abstract 3) and Sjögren and Halling (abstract 4) concluded that composite resin restorations are not the most cost-effective restorations a dentist can provide. Depending on the patient's priorities this may be acceptable, but the patient should also be informed that placing posterior resin composites might cause additional long-term problems. Gordan and others (abstract 5) showed that more natural tooth structure is removed when replacing an old tooth-coloured restoration. Franz and others (abstract 6) reported that freshly placed resin composites were cytotoxic in cell culture tests and that

cytotoxicity increased when the specimens were irradiated in 5-mm thick increments. These findings suggest that inadequately polymerized resin composites are more cytotoxic and potentially more harmful to the patient than adequately polymerized composites.

In the November/December 2001 issue of *Communiqué*, it was reported that a dentist was ordered to pay \$27,752 to a patient for failing to inform her of the limitations and comparatively short lifespan of resin composites. Unfortunately, dentists often use products not on the basis of unbiased, well-controlled, long-term clinical trials, but on laboratory data or short-term clinical trials. Hopefully, today's newer improved composite resins will last longer and be more biocompatible than earlier materials. However, not enough time has elapsed to obtain clinical evidence indicating whether the new composites and bonding systems are any better than previous materials. Furthermore, by the time a 5-year clinical trial is completed, the products may have already been replaced with new "improved" versions.

Patients should therefore be informed that placing successful posterior resin composites is a technique-sensitive procedure and that posterior resin composites may not be as biocompatible as previously thought. They should also be told that these restorations do not last as long nor are they as cost-effective as amalgam. Hopefully, with today's improved materials and better dental education, posterior resin composite restorations will last longer and cause fewer problems. ♦

1 Does the choice of material used to restore a posterior tooth affect the survival of the restoration?

Bogacki RE, Hunt RJ, del Aguila M, Smith WR. Survival analysis of posterior restorations using an insurance claims database. *Oper Dent* 2002; 27(5):488–92.

Background

Dentists are increasingly using resin composite rather than amalgam to restore posterior teeth. Estimates of restoration survival conducted before 1990 indicated that the longevity of amalgam restorations was approximately double that of composite restorations. However, the properties of composites have improved considerably during the past decade. This study aimed to compare the longevity of modern composites with amalgam.

Methods

Data for this study came from insurance claims for dental treatment provided between 1993 and 2000. Data for adult patients who had received either an amalgam or a composite restoration (including occlusal and at least 1 other surface) were included. All patients were followed for at least 6 months.

Results

Patients with amalgam restorations were followed for an average of 44 months, while those with composite restorations were followed for an average of 36 months. Kaplan Meier survival curves showed that for patients who stayed with the same dentist, amalgams had a 0.94 probability of surviving 5 years, while composites had a 5-year survival probability of 0.93. A patient with a composite restoration had a 16.4% greater chance of the restoration failing at any given time, than a patient with an amalgam restoration. Amalgams tend to fare worse when a patient changes dentist.

Clinical Significance

This study indicates that composite restorations do not last as long as amalgam restorations in posterior teeth. ♦

2 What is the state of the evidence on the longevity of posterior resin composite restorations?

Hondrum SO. The longevity of resin-based composite restorations in posterior teeth. *Gen Dent* 2000; 48(4):398–404.

Background

Some reports are now appearing which claim that resin-based composite restorations last as long as amalgam restorations in posterior teeth. However, many reports on this topic are contradictory. The author conducted a literature review to discover the “state of the science” relating to the longevity of posterior restorative materials.

Methods

This is a nonsystematic review of published work on the longevity of posterior resin-based composite, glass ionomer, amalgam, high-noble metal inlays and CAD/CAM restorations. On the basis of this review, the author states that reports on the longevity of restorations have to be read with caution for a number of reasons outlined in the Results section.

Results

There have been few randomized, well-controlled, long-term clinical trials of resin-based composite and amalgam posterior restorations. In part, rapid developments in resin-based composite materials make such trials difficult to

conduct, because resin-based composites are often not on the market long enough to allow a 5–10 year evaluation.

Based on 43 retrospective studies on the longevity of various restorative materials, the author reported that direct posterior resin composites last 3 to 9 years (median of 5 years). Amalgam restorations last 5 to 25 years (median of 11 years). The initial cost of a Class II direct posterior resin composite is 2 to 3 times greater than a Class II amalgam restoration. The wide range of rates of composite failure, observed in different studies can be attributed to patient attrition, lack of standard criteria for success and failure, and poor sensitivity of diagnostic methods. Compounding such problems, circumstances in private practice differ greatly from those in which university-based clinical trials take place. Thus, longevity of posterior resin-based composites in private practice may be shorter than that observed in clinical studies.

Clinical Significance

The expected median lifespan of amalgam restorations (11 years) is greater than that of posterior composites (5 years). Amalgam remains the most forgiving, low-cost and durable posterior restorative material. ♦

3 Are amalgam restorations more cost-effective than composite resin restorations?

Tobi H, Kreulen CM, Vondeling H, van Amerongen WE. Cost-effectiveness of composite resins and amalgam in the replacement of amalgam Class II restorations. *Community Dent Oral Epidemiol* 1999; 27(2):137-43.

Background

When choosing a dental material to replace an old amalgam Class II restoration, dentists must factor in esthetics, possible adverse health effects, treatment outcomes and costs. This study reports on the cost-effectiveness of replacing amalgam Class II restorations with composite resins and amalgam.

Methods

As part of a larger controlled clinical trial, 73 amalgam Class II restorations were replaced with 53 composite restorations and 20 amalgam restorations. Treatment effectiveness and treatment costs were estimated based on longevity (primary outcome), need of repair and marginal adaptation in situ. Treatment time was used to approximate treatment costs.

Results

After 5 years, there was no significant difference in primary outcome between amalgam and composite

restorations; differences in secondary outcomes were minor and did not all favour the same material. Treatment time needed to replace the restorations with composite was almost double that required to replace the restorations with amalgam. Analysis taking into account type of composite, greater proficiency in the use of composites and time to remove the material in future still demonstrated a difference in treatment time favouring amalgam. Since amalgam restorations are associated with lower costs, they should be the treatment of choice in terms of "value for money."

Clinical Significance

The authors tentatively conclude that amalgam should be preferred over composites for replacing Class II amalgam restorations, because they are more cost-effective. However, they acknowledge that choice of restorative material is not based exclusively on cost considerations, but also on patient demands. ♦

4 Which Class II restorations are most cost-effective in the long term?

Sjögren P, Halling A. Long-term cost of direct Class II molar restorations. *Swed Dent J* 2002; 26(3):107-14.

Background

To encourage the use of mercury-free restorative materials in Sweden, the dental health insurance system no longer subsidizes amalgam restorations. This decision has resulted in lower short-term costs. However, since nonamalgam restorations do not last as long as amalgam restorations, the authors wonder about the long-term cost-effectiveness of this solution. Their aim was to evaluate the long-term treatment costs of amalgam, composite and glass ionomer Class II molar restorations.

Methods

Long-term treatment costs were calculated based on mean survival times of Class II molar restorations (data derived from longevity studies in Nordic countries) and fee schedules from public dental services in Sweden, for patients, social insurance offices, and total cost. Sensitivity calculations for the costs per year of function were also

performed for both initial and long-term costs. All calculations were extrapolated over 10 years.

Results

Glass ionomer restorations had the lowest initial total cost and resin composites had the highest initial cost. Amalgam had the lowest long-term total cost based on the longest mean survival times. Class II composite restorations had the highest total cost over 10 years.

Clinical Significance

The considerable differences in the long-term costs of different materials used for Class II molar restorations highlight the importance of evaluating interventions on a lifetime basis, as short-term economic solutions may lead to higher costs over the long term. Furthermore, longevity and reasonable long-term costs indicate that amalgam restorations would be the most feasible long-term alternative for patients, unless they prefer not to choose amalgam. ♦

5 Does the replacement of resin-based composite restorations result in larger restorations?

Gordan VV, Mondragon E, Shen C. Replacement of resin-based composite: evaluation of cavity design, cavity depth, and shade matching. *Quintessence Int* 2002; 33(4):273–8.

Background

Resin-based composite restorations must be replaced when secondary caries are diagnosed or if the restoration fails. The size of the cavity preparation increases significantly when these restorations are replaced because the life-like appearance of the material makes it difficult to discern the cavity margins. This study evaluated whether cavity design, cavity depth and shade matching have any effect on the size of cavity preparation in the replacement of Class I resin-based composite restorations.

Methods

Class I cavity preparations were prepared in 40 extracted premolars, with cavity depths of either 1.5 or 2.5 mm. Divergent cavity designs were prepared on 20 teeth and parallel designs were prepared on the other 20. Resin-based composite material was shade-matched to the tooth in half the restorations, and a material that was 3 shades different

was used in the other half. Using magnification and with carbide burs, 2 experienced clinicians removed the composite restorations. Impressions were made before filling the cavities with composite and after removing the composite. Stone casts were made and the differences in preoperative and postoperative perimeter were measured.

Results

Removing the resin composite resulted in a significant loss of tooth structure, with the cavities that were 2.5-mm deep losing the most tooth structure. Cavity design and shade matching did not have a statistically significant effect on the loss of tooth structure.

Clinical Significance

There is greater loss of tooth structure when Class I resin-based composite restorations are replaced, especially with the deeper cavity preparations. Repeated replacements of these restorations will result in larger restorations. ♦

6 Does increment thickness influence the cytotoxicity of the new dental composite materials?

Franz A, Konig F, Anglmayer M, Rausch-Fan X, Gille G, Rausch WD, Lucas T, and others. Cytotoxic effects of packable and nonpackable dental composites. *Dent Mater* 2003; 19(5):382–92.

Background

Manufacturers claim that the new packable and nonpackable composite materials, intended as alternatives to amalgam for posterior restorations, can be light-cured in increments of 5 mm. The effect of the greater increment thickness on the cytotoxicity of these materials has not been previously investigated. This study analyzed the cytotoxicity of the new composites in comparison to an established nonpackable composite, including the influence of the increment thickness on the cytotoxicity of these materials, using a standardized cell culture system.

Methods

Specimens made using 7 different composites were prepared in polyethylene blocks covered with mylar. All materials were hardened with the Demetron curing light (light intensity: 550 mW/cm²) in increments of 2.5 or 5 mm. The specimens were either tested immediately after production or preincubated in cell culture medium for 1, 2, 7 days or 6 weeks. L-929 fibroblasts were exposed to the freshly prepared and preincubated specimens for 72 hours.

Cell numbers were then determined by flow cytometry and compared to controls (cultures without specimens).

Results

Results with L-929 fibroblasts showed that the freshly prepared composite materials had reduced cell numbers ($p < 0.05$) compared to the controls. There was a reduction of cytotoxicity for all materials with increased preincubation times ($p < 0.0001$). The established composite and 2 of the advanced composites demonstrated less toxicity; there were moderate or severe cytotoxic effects with the other advanced composites. Cytotoxicity increased for all materials placed in 5 mm increments, compared to 2 mm increments ($p < 0.0001$).

Clinical Significance

Results indicate that advanced composites have similar or more pronounced cytotoxicity than the established nonpackable composite. Light curing in increments of 5 mm increases cytotoxicity of these materials. The advanced packable composites tested showed similar or even more cytotoxicity than the nonpackable established composite. ♦

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CORRECTION

The June issue of *JCDA* was a collaborative effort between the Canadian Dental Association and the Canadian Association of Orthodontists. Due to an administrative error by CAO several members' names were inadvertently omitted from the listing of practising CAO members contained in that issue. We sincerely apologize to the following members for this error.

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Dr. Vincent Dontigny

To obtain the updated list of CAO members visit *JCDA's* Web site at www.cda-adc.ca/jcda/vol-69/issue-6/359.pdf.

CDA'S DEFINITION OF ORAL HEALTH

Oral health is a state of the oral and related tissues and structures that contributes positively to physical, mental and social well-being and the enjoyment of life's possibilities, by allowing the individual to speak, eat and socialize unhindered by pain, discomfort or embarrassment.

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Point of Care

The Point of Care section of JCD A answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. Readers are encouraged to do more reading on the topics covered. This month's responses were provided by members of the Canadian Academy of Restorative Dentistry and Prosthodontics. 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 Oral rehabilitation for the asymptomatic patient: what starting position should I choose?

Background to the Problem

Being able to predictably manage the relationship of the mandible to the rest of the cranium is of the outmost importance in oral rehabilitation. Various jaw relationships have been suggested as the optimal starting position. Some practitioners routinely choose maximum intercuspation (habit bite), whereas others choose myocentric or centric relation.¹ Unfortunately, many practitioners are confused as to which starting position is best.

Maximum intercuspation (MI) is produced when a person closes his or her mandible to a position of maximum tooth interdigitation. This yields an accurate jaw-to-jaw relation and thus is frequently used for dental treatment. Procedures involving a few teeth can be readily carried out at MI; however, for procedures that require more operator control, another starting position should be selected. Myocentric is a popular concept and treatment position that involves use of a transcutaneous electrical nerve stimulation (TENS) unit to stimulate the neuromusculature, presumably to optimize the physiologic characteristics of the musculature and thereby provide a physiologic jaw relationship. Proponents of this technique claim consistency in the mandibular position and thus the jaw relationships that are attained.² In the resultant position, the mandible tends to be positioned downward and forward relative to MI,

which results in an increased vertical dimension of occlusion.³ Myocentric tends to be dictated by the muscles. Centric relation has been defined in many ways over the years.¹ According to the current popular definition, the condyle of the mandible is placed in the uppermost, forwardmost position in the glenoid fossa with the articular disk superimposed.⁴ Centric relation tends to be determined by the bones and ligaments. Proponents of this position also claim consistency.⁵ As the mandible is guided to closure in centric relation, the teeth close into MI in roughly 10% of cases, and when this does occur MI is termed centric occlusion.^{1,6}

Solution to the Problem

Because the practitioner has choices in selecting a starting position for jaw interrelationships, it is essential to realize that in the absence of any abnormality of the temporomandibular joint or mandibular dysfunction (i.e., in an asymptomatic patient), the goal is not to achieve a particular treatment position (although this is an important variable) but rather to ensure the reproducibility of that position. In other words, the key is reproducibility, not location. As long as the practitioner learns one or more techniques to accurately and consistently relate the mandible to the maxilla then the predictability of oral rehabilitation is facilitated. I like to refer to this concept of jaw

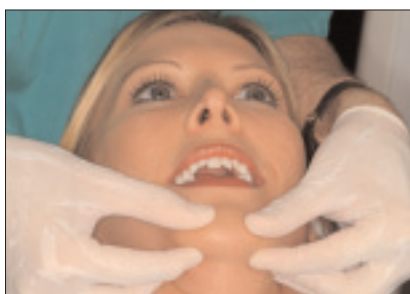


Figure 1a: Bimanual manipulation guidance.

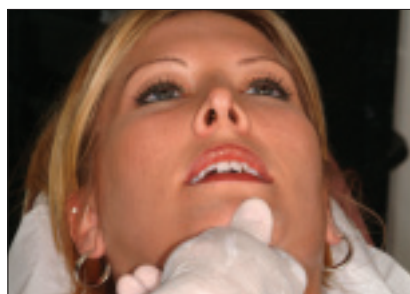


Figure 1b: Chin point guidance.

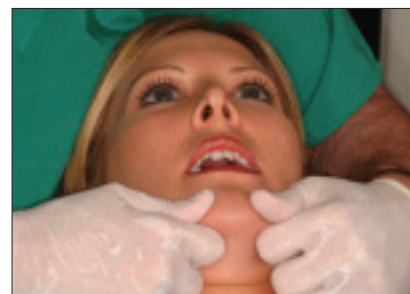


Figure 1c: Modified mandibular guidance.

interrelationships and starting position as CR, or “consistent reproducibility.” The techniques the practitioner chooses are a matter of personal preference. I routinely position the mandible such that the condyle is in the uppermost, forwardmost aspect of the glenoid fossa using either bimanual manipulation guidance, chin point guidance or modified mandibular guidance, the choice of technique for any particular patient depending on my ability to achieve consistency and reproducibility (Fig. 1).^{4,7} Sometimes, I use a more forward and downward position (e.g., “skeletal Class IIs that want to be skeletal Class Is”), again ensuring that I can achieve reproducibility in my jaw-guiding techniques.

Regardless of which starting treatment position or technique is used in oral rehabilitation, the practitioner must remember that all treatment plans should be individualized, combining his or her technical ability with the patient’s desires. ♦

Dr. Michael Racich is a general practitioner in downtown Vancouver, B.C., with practice emphasis on orofacial pain and comprehensive restorative dentistry and prosthodontic care.

References

1. Glossary of prosthodontic terms. *J Prosthet Dent* 1999; 81(1):39–110.
2. Jankelson B. Neuromuscular aspects of occlusion. Effect of occlusal position on the physiology and dysfunction of the mandibular musculature. *Dent Clin North Am* 1979; 23(2):157–68.
3. Remien JC 2nd, Ash M Jr. “Myo-Monitor centric”: an evaluation. *J Prosthet Dent* 1974; 31(2):137–45.
4. Dawson PE. Evaluation, diagnosis and treatment of occlusal problems. 2nd ed. St. Louis: Mosby; 1989.
5. Kantor ME, Silverman SI, Garfinkel L. Centric relation recording techniques — a comparative investigation. *J Prosthet Dent* 1972; 28(6):593–600.
6. Beyron H. Optimal occlusion. *Dent Clin North Am* 1969; 13(3):537–54.
7. Guichet NF. Occlusion: a teaching manual. 2nd ed. Anaheim: Denar Corp.; 1977.

Question 2

How can I use canine risers to restore canine disocclusion?

Background to the Problem

Natural teeth wear over time, and the loss of enamel tooth structure may ultimately expose the dentin, causing tooth sensitivity and, in some cases, devitalization. The reasons for tooth wear are many. Age-related wear is normal, whereas pathologic wear may result from trauma, parafunction or other activities.

Sleeping posture is known to affect jaw parafunction and unilateral tooth wear.¹ If the canines on one side are extremely worn, the dentist is advised to determine the patient’s habitual sleeping position. A pattern of unilateral side-sleeping often causes wear of the canines on the opposite side (frequently with key-in-lock facets), as well as balancing interferences and temporomandibular joint (TMJ) and muscle pain on the sleeping side.

The purpose of canine guidance and canine-protected occlusion is to disocclude the anterior and posterior teeth. As canine wear progresses, the posterior teeth begin to contact in lateral movements and are more prone to symptoms of tooth overload. The anterior teeth (especially the laterals) can also become notched and worn.

Flat guidances² are more often associated with TMJ changes on the ipsilateral side.

Management

A dental appliance is often the first approach to treatment. The stabilization splint, often referred to as a Michigan splint, is most effective for stabilizing occlusions

and restoring canine protection. Such an appliance should provide for canine lift-off and clearance of any anterior and posterior tooth contacts. The splint is effective while it is being worn. It is primarily worn at night, and may be impractical for day wear.

Training risers made of composite are useful in that they are a full-time measure and can convince the patient or the dentist of the need for a permanent restoration.

Permanent restorations include bonded porcelain or processed ceramic risers, as well as cast gold, metal–ceramic or all-ceramic full- or partial-coverage restorations.

Desirable Patterns of Canine Guidance

Improving canine guidance must involve both canines on the side being treated. Ideally, the lower distal and upper mesial surfaces glide across one another, producing latero-protrusive movement pattern of the jaw, with a downward vector or disocclusion. All ipsilateral posterior working contacts should be concurrently relieved, as should any remaining contralateral balancing interferences. When the treatment is effective, there will be a remittance of early TMJ clicking on the contralateral side. To test the effectiveness of the downward movement of the canines, brace a thin metal spatula against the upper canine and train the patient to move the jaw sideways on the blade of the spatula while palpating the opposite TMJ from the auditory canal. This approach is equally effective in



Figure 1: Acetate shell is fitted over the canine tooth.



Figure 2: Acetate shell is removed before occlusal refinement.



Figure 3: Completed riser provides lift-off in right lateral movement.

demonstrating the effectiveness of removing the balancing or nonworking interferences by occlusal refinement.

Training Risers

1. Give your patient a written statement indicating that this is a provisional training service, not a permanent solution. Informed consent and an estimate of cost are required.
2. Concurrent occlusal adjustment of the balance of the mouth is frequently needed.
3. Determine which surface is most damaged. Check the opposite canine, and reshape it to a more optimal form.
4. Minimal tooth reduction will be required. The enamel must be roughened, but tooth reduction of 0.3 mm is usually sufficient. On the inside or palatal surface, leave 0.5 mm of clearance. Use cheek and lip retractors (Morita, J Morita Corporation, Kyoto, Japan) to provide access to the tooth.
5. Use a transparent plastic crown form, ideally positioned on a diagnostic model, and trim the form to cover only the tip of the canine tooth. Place one or more vent holes from the inside of the crown form (Fig. 1).
6. Select a microhybrid composite with good flow characteristics.
7. Isolate and etch the prepared portion of the tooth. Use dentin bonding agent if dentin is involved or unfilled resin. Do not overfill the crown form.
8. Seat the loaded crown form in place, and use your fingers to mimic the shape of the canine.
9. Remove the acetate shell (Fig. 2), trim, confirm the desirable occlusal design and polish (Fig. 3).
10. Monitor 3 times yearly for wear. Fracture or chipping indicates overload. Anticipate a lifespan of 12–36 months.
11. A supportive night splint or appliance may also be needed.
12. Canine risers should not be considered an insurance benefit, because they represent a provisional service. Any insurance benefit should be claimed when the permanent restoration is done.

Limitations

This approach is useful when damage to the canine tooth is slight. More severe tooth breakdown requires a more definitive restorative approach. ♦

Dr. Nasedkin is a certified specialist in prosthetic dentistry in Vancouver, B.C. He has no declared financial interest in the companies manufacturing the types of products mentioned in this article.

References

1. Colquitt T. The sleep-wear syndrome. *J Prosthet Dent* 1987; 57(1):33–41.
2. Ferrario VF, Sforza C, Sigurta D, Dalloca LL. Temporomandibular joint dysfunction and flat lateral guidances: a clinical association. *J Prosthet Dent* 1996; 75(5):534–9.

Question 3

Can implants be bridged to natural teeth?

Background to the Problem

Natural teeth are connected to bone by a periodontal membrane, which acts as a suspensory ligament. It is widely recognized that this attachment apparatus allows displacement of the natural root, which can occur as a consequence of functional or parafunctional loading.

However, root form implants do not have any capacity for movement because the periodontal membrane is absent.

The issue of loading dynamics is complex when fixed bridges are made on natural teeth because of variation in numbers of existing tooth roots, root size and morphology, bone site density and zones of application of mechanical

forces. These dynamics become even more complex (and create a clinical issue) when a movable tooth abutment is connected to an immobile implant abutment. The primary concern is that when the prosthesis is loaded, displacement may occur at the natural root and cause the implant abutment to accept the brunt of the loading forces.

The 2 main problems associated with an implant–pontic–tooth prosthesis are as follows:

- Progressive bone loss at the implant through accumulation of excessive shear forces.
- Intrusion phenomenon of the natural root, a problem that often develops when nonrigid connectors are used or when copings or telescopes are used with provisional cement or no cement at all.^{2,3}

The prevailing approach within the profession is to avoid connecting root form implants to natural teeth. However, there are many circumstances (e.g., Fig. 1) in which treatment would be much less complex and less costly if the implants could be connected to natural teeth without adverse effects (Fig. 2). In recent studies, some problems have arisen from connecting implants to natural teeth, but the success rate has been encouraging.^{1–3}

Management of the Problem

As with many clinical situations, optimal case selection goes a long way toward minimizing problems. Disadvantageous mismatching of abutments should be avoided, such as having a small implant in porous bone connected to a weak-rooted mobile tooth in an area of concentrated compressive loading.

Factors to Be Considered

- The implant abutment should be of substantial size and should be placed in type II bone to best withstand the increase in shear forces that can arise from this type of hybrid bridge system.
- The pontic should have a short span, preferably only a single tooth, to minimize torque forces on the abutments.
- The natural root abutment should have good stability, preferably with no mobility and the tooth should preferably be multirrooted to minimize tooth displacement.



Figure 1: Hopeless tooth 24 could be implanted and connected to tooth 27 because the adjacent tooth, which has been treated endodontically, is weak, and the patient has a low sinus cavity.

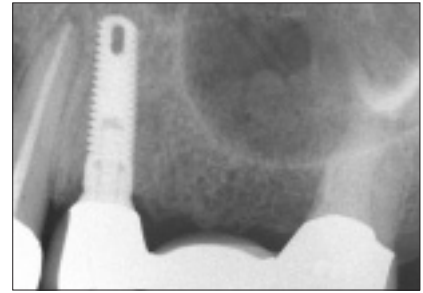


Figure 2: Radiograph of the restored implant bridged to a natural tooth, one year later.

- Both abutment connectors should have a rigid connector design. Nonrigid attachments should be avoided as they are associated with a greater incidence of root intrusion.
- If telescopes or copings are used, avoid temporary cements; in particular, avoid the no-cement coping technique, as loss or absence of a rigid connection will induce the highest incidence of intrusion.
- Use highly retentive cements with superior design features for retentive preparation at the abutment to resist cementation failure.
- Eliminate or minimize unbalanced tooth contacts in excursive movements and in centric contact.
- Consider bruxism as a risk factor; if present, manage bruxism with an antibruxism splint, preferably placed on the arch that contains the bridge. ♦

Dr. Dennis Nimchuk is a certified specialist in prosthodontics and is in private practice in Vancouver, B.C.

References

1. Tangerud T, Gronningsaeter AG, Taylor A. Fixed partial dentures supported by natural teeth and Branemark system implants: a 3-year report. *Int J Oral Maxillofac Implants* 2002; 17(2):212–9.
2. Naert IE, Duyck JAJ, Hosny MMF, Van Steenberghe D. Freestanding and tooth-implant connected prostheses in the treatment of partially edentulous patients. Part I: an up to 15-years clinical evaluation. *Clin Oral Implants Res* 2001; 12(3):237–44.
3. Block MS, Lirette D, Gardiner D, Li L, Finger IM, Hochstedler J, and others. Prospective evaluation of implants connected to teeth. *Int J Oral Maxillofac Implants* 2002; 17(4):473–87

Question 4 How should I conduct a smile analysis as part of treatment planning?

Background to the Issue

While the identification of esthetic problems in a patient's dentition can sometimes be difficult, visualizing the esthetic end result of treatment is a real challenge. To lessen these difficulties, it is useful to have a systematic approach to smile analysis in order to plan esthetic restorative treatment effectively. Improved communication with specialists and laboratory personnel is an added benefit of such a systematic approach.

Much of the information pertinent to treatment planning in dental esthetics derives from the face, with attractiveness coming from a general sense of balance between 3 key facial features: the interpupillary line, the facial midline and the commissural line. Through orienting the positions of the incisal plane, the highest lip line, the midline axis and proportionate contact areas with these facial features, it is possible to form an "esthetic grid" that is a handy treatment planning tool. Direct visualization of the patient and assessment of facial photographs are invaluable means of conducting a smile analysis.

Management of the Issue

The step-by-step approach to using the esthetic grid that I prefer is outlined below.

- a) Establish if there is facial symmetry. This entails establishing the orientation of the interpupillary line, the commissural line and the facial midline. The first 2 facial features should be parallel to the horizon, with the head erect (Fig. 1).
- b) With the patient smiling broadly, record the height of the upper lip. This measurement shows how much gingiva is displayed during a full smile and also allows you to measure the length of the central incisors. The "ideal" smile reveals the full length of the central incisors and about 1 mm of gingiva. Gingival harmony becomes a consideration if gingival tissue is revealed during a full smile (Fig. 2). Also assess the positioning of the incisal edges relative to the lower lip and the facial midline in a relaxed smile.
- c) Take an anterior photograph of the patient's dentition with lips retracted. The horizontal frame of the



Figure 1: Midline axis deviation to the patient's left is readily apparent.



Figure 2: The highest lip line reveals excessive marginal tissue and disproportionate gingival levels.



Figure 3: The grid, oriented to the facial features by the photograph, shows planned incisal edge and gingival levels. The uppermost line represents the highest lip line.



Figure 4: Orthodontic intrusion allows for a more idealized width-length ratio and more balanced tissue levels.



Figure 5: Final restorations provide a balanced tooth arrangement.



Figure 6: The dental composition is enhanced through the repositioning of the incisal plane and gingival levels.

photograph should be parallel to the interpupillary line if the line is parallel to the horizon; otherwise the horizontal frame is placed at right angle to the facial midline.

- d) Draw lines on the photograph showing the idealized positions of the incisal plane, the dental midline and the contact areas. Also draw the highest lip line on the photograph (Fig. 3).

The incisal edge of the maxillary central incisor is the “cornerstone” of the smile and the desired position of this landmark should be the first to be drawn. This position varies with the smile of the individual and should be natural for that individual, taking age and lip mobility into account.

The highest lip line is drawn next on the photograph. This done, the midline axis is drawn perpendicular to the incisal plane. Whether this axis is in the middle or slightly to one side is a matter of clinical judgment. The last elements to be drawn are proportionate and symmetric contact areas, particularly of the central incisors.

These final elements are important because they establish the central incisors as the dominant element in the dental composition. Lombardi pointed to the importance of developing a proportionate relationship between the

widths of the maxillary central incisor, lateral incisor and canine. Various formulas have been proposed for these proportionate relationships, the Golden Proportion being the most widely used. This convention states that the width of the maxillary central incisor multiplied by 0.618 should be the width of lateral incisor, and that the width of the lateral incisor multiplied by 0.618 is the ideal width of the maxillary canine. A general guideline for an esthetic width-to-length ratio is 0.75–0.80 (Fig. 4). Lower values create a long, narrow tooth whereas higher values result in a short, wide tooth.

The esthetic grid is an aid that helps the clinician appreciate how a patient’s smile deviates from the “ideal.” It also helps the clinician plan treatment (Figs. 5 and 6) and communicate treatment objectives to the patient, the laboratory and professional colleagues. ♦

Dr. Craig Naylor maintains a private prosthodontics practice in Vancouver, B.C.

Further Reading

- Goldstein RE. Esthetics in dentistry. Philadelphia: JB Lippincott, 1976.
- Lombardi RE. The principles of visual perception and their clinical application to denture esthetics. *J Prosthet Dent* 1973; 29(4):358–82.
- Naylor CK. Esthetic treatment planning: the grid analysis system. *J Esthet Restor Dent* 2002; 14(2):76–84.



LISTERINE



Mr. Jon Coleman, Vice President and General Manager, Pfizer Consumer Healthcare, and Dr. Tom Breneman, President of the Canadian Dental Association (CDA) are pleased to announce Pfizer Canada’s sponsorship of the CDA President’s Dinner, held in conjunction with the 2003 CDA Meetings of the General Assembly and Strategic Forum in Ottawa.

The Listerine brand group extends its best wishes to the Canadian Dental Association, its President, Dr. Tom Breneman, and incoming President, Dr. Louis Dubé.



The Canadian Academy of Restorative Dentistry and Prosthodontics
L'Académie canadienne de dentisterie restauratrice et de prosthodontie



Annual Scientific Meeting

Toronto Marriott Eaton Centre Hotel

Friday, October 3, 2003

Essayists

- Antonio Bello** – A New Ceramic Implant Abutment: Research and Clinical Application
C. Larry Cloetta – Making Accurate Gold Castings
Lloyd L. Miller – Cultivating Core Values in Esthetic Dentistry
Gideon Nussbaum – Comprehensive Restorative Treatment: A Gnathological Perspective
Ward Smalley – Utilization of Implants as Anchorage for Orthodontic Correction of Malocclusion
W. Keith Thornton – Management of Sleep Disordered Breathing

Saturday, October 4, 2003

Projected Clinics

- Deborah Batttrum** – Diagnosis of Post-Endodontic Problems and Solutions
Robert Bond – Pre-Prosthetic Tooth Movement: Simple, Effective, Aesthetic
Allen Burgoyne – Implants
Cameron Cloakie – Site Development Strategies for Dental Implant Patients
Carlo Ercoli – Implant Dentistry, Drills and Jigs
James Metz – Is the Orofacial Pain TMD? Differential Diagnosis and Testing
Jim Soltys – Porcelain: Yesterday, Today and Tomorrow
Ross Talents – Provisional Restorations for Implant Prostheses

Table Clinics

- Peter Bastien** – The Fibre Reinforced Anterior Bridge
Deborah Batttrum – Endo Problems and Solutions
Al MacDonald – Pre-Prosthetic Tooth Movement: Simple, Effective, Aesthetic – A Case Study
Carlo Ercoli – Cutting Efficiency and Surface Design of Diamond Burs
Neena D'Sousa – Tooth Wear, Etiology and Rehabilitation
Trevor Laingchild RDT – The Functional Diagnostic Wax-up for Advanced Aesthetic Restorations
Sean Meitner – A Surgical Template for Prosthetic Driven Implant Placement
James Metz – Stress Test TMJ & Muscles of Mastication
Bill Missert – Cadiax: A Functional Instrumental Analysis
Gerry Ross – Low Level Lasers in Dentistry
Paul Rotsaert RDT – Custom Milled Attachments for Lower Posterior Bridges
Paula Sikorski and Martin Bourgeois – Pre-Surgical Implant Imaging
Jim Soltys – Porcelain
Peter Taylor – Use of ITI Implants in the Maxillary Anterior
Ross Talents – Outcome Measures of Splint Therapy

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The CDA is grateful to Colgate-Palmolive for its generous sponsorship of the D.I.S. program. The D.I.S. booklets are written by the CDA and produced and distributed by Canadian Dental Service Plans Inc. (CDSPI).



CDSPI Reports

DEFENDING MALPRACTICE WITH GOOD RECORD KEEPING

By John B. Arnesen, LLB

While clinical records primarily fulfill a clinical purpose, they also play an important role in the area of legal risk management.

When a patient complains about a dentist, one of the first tasks undertaken by the regulatory body or the patient's lawyer is a review of the dental chart. This review will often determine whether further investigation is warranted or a lawsuit commenced. Even if a claim is without merit, poor records hamper a successful defense, and so can result in either a settlement or judgment that could have been avoided.

Poor records inevitably lead to uncertainty, confusion and inconsistency in a dentist's recollection of treatment and in testimony at trial. As well, the uncertainty that poor records create casts doubt on the quality of treatment provided to a patient. As a result, poor records can in fact promote complaints and lawsuits, while good records can dissuade such problems.

A dentist who has treated hundreds of patients does not have a detailed recollection of the specific treatment provided to any particular patient. The patient's experience with the dentist, however, is more unique to the patient and courts often find that a patient's recollection of discussions or events is more reliable than the dentist's. Obviously, deficient clinical

records will not shift the balance in the dentist's favour.

Complete and accurate notes that are recorded at the time of the treatment carry significant weight in court, however. Such records refresh recollection, provide concrete documentary evidence of past events and are often the only reliable indication of what occurred. The reliance a court will place upon dental records correlates with their clarity, completeness and contemporaneousness.

Malpractice lawsuits often hinge on expert evidence that is based on the clinical records involved. Poor records inevitably provoke condemnation from the patient's experts and hinder the dentist's experts in producing a supportive opinion. Experts basing their opinions on inadequate records are more easily confounded and challenged on cross-examination.

The best clinical records are legible, detailed, accurate and made at the time of the treatment. All entries should be professional and objective. As a general rule, the more information recorded the better. The dentist should make his or her own entries and review the entries of others. Every entry should be initialed by the author.

If a portion of a preprinted form is inapplicable, then that ought to be noted rather than leaving the document blank, which suggests an oversight or haste. If entries are made on a preprinted schematic on several occasions, then each entry ought to be dated or a new schematic used.

Frequently, insufficient attention is paid to a patient's medical history. Preferably, the patient should be given a preprinted form to complete, date and sign. The history ought to be reviewed with the patient and that review documented with the date and the dentist's initials. At each visit, the patient ought to be asked about

changes in his or her medical history and the response recorded, including no change. Periodically, a new medical form should be completed and reviewed.

A new patient's dental status and history ought to be recorded in significant detail so that old treatment can be differentiated from new.

Obviously, all diagnoses should be recorded along with the treatment plan and alterations to it. The discussion of all treatment options (including the option of no treatment), and all associated risks and benefits ought to be recorded in a style and language that is understood by the patient. If a separate informed consent form is not used, then consider having the patient initial the appropriate entry in the chart.

Progress notes form the bulk of most dental charts, but typically lack detail. Each entry ought to be dated and should record any comments made by the patient, all procedures performed and materials and anaesthetics used. The patient's reaction to the treatment along with all postoperative instructions and prescriptions should be documented. All unusual circumstances need to be fully detailed and any alteration to the treatment plan set out in full. X-rays, models, photographs and drawings should be dated. The chart ought to include all referral documents, consultation reports, financial statements and insurance records.

Telephone calls and conversations need to be documented. Missed appointments ought to be recorded, along with the purpose of the appointment and reason why it was missed. All attempts to reset the appointment should be noted.

If a patient declines treatment or is otherwise noncompliant, an objective and comprehensive notation is required documenting the entire exchange, including the advice given

concerning potential consequences of the failure to follow recommendations. Preferably, the patient will initial the chart, but otherwise the attending assistant should make an independent entry in the chart.

If a patient chooses to leave the practice, then a clear entry should be made in the chart stating the reason for the departure and any recommendations left with the patient for future care.

It is crucial to the integrity of the dental chart that entries never be altered, backdated or erased. The discovery of any alteration will rob a dental chart of reliability and undermine the defence of a malpractice lawsuit. If an error is made, then it

ought to be scored out with a single line, initialed and the correct information re-entered.

By maintaining an accurate and complete dental chart, a dentist not only provides a better service to the patient, but creates a record that can assist in either avoiding or successfully defending malpractice claims. ♦

John B. Arnesen is a partner in the Vancouver law firm of Lindsay Kenney and practises in the area of professional malpractice.

CDSPI  Information provided by Canadian Dental Service Plans Inc.



**Attention All New Dentists:
Your Opinion Counts!**

Later on this month, please watch for a special mailing from CDA. A very brief survey will be enclosed that explores the attitudes, challenges and needs of new dentists so that CDA can better meet your current and future needs.

Help us help you by completing our survey and returning it by fax, or if you prefer, as of July 28, you can complete it online at www.cda-adc.ca.

Thank you in advance for your participation!



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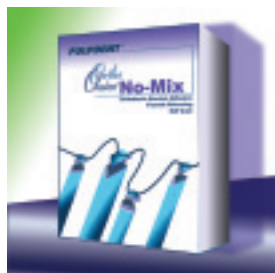
2003 Awards Ceremony & Luncheon

Mr. M. A. Hart, Chairman of Ash Temple Limited, and Dr. Tom Breneman, President of the Canadian Dental Association (CDA), are pleased to announce Ash Temple Limited's sponsorship of the CDA Awards Ceremony & Luncheon, held in conjunction with the 2003 Meetings of the General Assembly and Strategic Forum in Ottawa on September 5-6, 2003.

CDA will recognize exceptional individuals from among the following award categories: Honorary Membership, Distinguished Service Award, Award of Merit, Certificate of Merit, Special Friend of Dentistry Award, and Oral Health Promotion Award.

New Products

JCDA's *New Products* section provides readers with brief descriptions of recent innovations in dentistry. Publication of this information does not imply endorsement by JCDA or the Canadian Dental Association. If you would like material to appear in JCDA's *New Products* listing, send all news releases and photographs to Rachel Galipeau, coordinator, publications, at rgalipeau@cda-adc.ca. English- and French-language material will be given priority.



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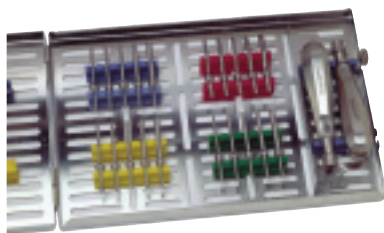
Sirona introduces the **Siroair L scaler**, which has been specially designed for the removal of subgingival and supragingival film and plaque. The handpiece boasts 3 power settings. The power output is adjusted directly on the handpiece, which allows the dentist to make optimum use of various scaling tips and periodontal tips. The **Siroair L** has a non-slip and easy-to-clean surface. Other features include a ring-shaped light (15,000 lux) to ensure optimum illumination of the preparation area. The spray water is adjusted via the ring on the handpiece coupling — another user-friendly feature.

• Sirona Dental Systems GmbH, +49 (0) 6251/ 16 2901, www.sirona.de •



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BRITISH COLUMBIA - Squamish: Full-time associate wanted for busy family dental practice in Squamish, B.C., to replace established associate. Good earning potential. Please mail CV with cover and references to: Competition #037, Box 44, 112-1151 Mt. Seymour Rd. N, Vancouver, BC V7H 2Y4. D1350

BRITISH COLUMBIA - Kamloops: Associate required with opportunity to buy into busy, progressive, fun practice. Contact: Dr. D. Barry Dextraze, 21 - 750 Fortune Dr., Kamloops, BC V2B 2L2; tel. (250) 376-5354, fax (250) 376-5367. D693

BRITISH COLUMBIA - Central: Associate wanted. Real small-town practice. Do it all, endodontics, crown and bridge, orthodontics, general anesthetics hospital setting, extended care, etc. Learn from over 30 years experience. Owner needs time for other interests and will mentor a few days a week. Full appointment book and excellent staff support and hygiene. Progressive practice with air-abrasion, microscope, new panorex, etc. E-mail collardp@telus.net D1364

MANITOBA - Pine Falls: An awesome lifestyle is available in this friendly rural town about 1 hour north of Winnipeg. Just minutes away from Grand Beach and great golf courses with good access to boating, fishing and snowmobiling. Comfortable accommodations available on site, if desired. An excellent opportunity for a new graduate to increase speed and earn incredible income. Please fax resume to: Dr. Alan Grant, (204) 367-4587, Attn: Heather or call us at (204) 367-2208 for more information. D1131

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

send resume to: Dr. Hill, Fort Smith Dental Clinic, PO Box 1047, Fort Smith, NT X0E 0P0. D1191

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

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

NUNAVUT - Iqaluit: Canada's newest capital requires associate dentists with all-round clinical skills. Modern office with all usual facilities and usual support. Standard associateships are offered on usual terms. Southern Baffin Island offers many opportunities for outdoor recreation and a wide range of dentistry. Principal of practice has 15 years northern experience and seeks associates willing to give long-term commitment. Apply to: Administration, PO Box 1118, Yellowknife, NT X1A 2N8 or call (867) 873-6940, fax (867) 873-6941. D1095

NUNAVUT - Iqaluit: Attention overseas graduates. Financial assistance and guaranteed job offer on graduation may be available to selected candidates. Please apply only if you are presently attending or have been accepted for a Canadian dental school. Apply to: Administration, PO Box 1118, Yellowknife, NT X1A 2N8 or call (867) 873-6940, fax (867) 873-6941. D1096

ONTARIO - Ottawa: Busy solo practice with 3 hygienists requires experienced bilingual associate. No weekends. Excellent opportunity for a motivated individual with an eye to the future. Fax (613) 739-7479. D1384

ONTARIO - Ancaster: An exceptional associateship leading to partnership within an upscale practice that is client/service focused and team run.

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ONTARIO - Niagara-on-the-Lake: Solo practitioner with successful leading-edge facility in Niagara-on-the-Lake searching for an outstanding full-time associate, possibly with a view to an eventual buy-in. Our attractive free-standing building, located on an acre of landscaped grounds, has state-of-the-art equipment and facilities inside. If you are confident, skilled and caring we would like to speak with you. Please call Anne, (905) 468-2128, Monday to Thursday, or fax (905) 468-2120. D1375

ONTARIO - Peterborough: Full-time associate needed for a progressive cosmetic-oriented dental practice. Facilities include 5 operatories with intraoral cameras, microabrasion units and wand computerized anesthesia in each. Working hours, 8 a.m. to 5 p.m., Monday to Friday. Candidates must have strong communication skills and work ethic, be kind and considerate in nature and have well above average technical skill. He/she must be a team player who is eager to learn (or enhance) advanced dental techniques. Potential for highly skilled associate to earn \$16,000 to \$20,000 per month. Fax resume to (705) 742-7809. D1372

ONTARIO - Eastern: (Between Montreal and Ottawa). Associateship available, part time or full time, in a modern and busy practice established for 13 years. Please fax CV to (613) 632-8396. D1309

ONTARIO - Southwestern: Oral and maxillofacial surgeon. Busy group practice is inviting applicants for association leading to partnership. Full scope surgical practice is seeking individual with full scope training. Hospital admitting privileges are now extended to this specialty in Ontario. Applications in writing can be submitted to: CDA Classified Box # 2836. D1336

ONTARIO - Kanata: Associate: seeking a dynamic, outgoing, team-oriented individual to join a large, well-established group practice in Kanata, Ontario. Our team of family dentists, hygienists, specialists (orthodontist, periodontist) and denture therapist provide progressive, preventive treatment to patients in the fastest growing area of the Nation's Capital. We provide on-site lab services for high-quality crowns, bridges, veneers and implants. Please call Catherine or Kaarla at (613) 592-2900, Monday to Thursday, between 8 a.m. - 3 p.m. Forward resume to the attention of: Dr. Burton Merkley, Hazeldean Dental Group, 300 Eagleson Rd., Kanata, ON K2M 1C9; fax (613) 592-4028. D1354

ONTARIO - Brockville: Experienced associate required for 1 of 2 well-established, busy practices. Enjoy a small-town atmosphere and the scenic beauty of the 1000 Islands region with easy access to large city centres. Only 30 minutes to Kingston and 60 minutes to Ottawa. For more information contact: Dr. George Christodoulou, Altima Dental Canada, tel. (416) 785-1828, ext. 201, e-mail drgeorge@altima.ca D1269

QUEBEC - Eastern Townships: We are giving an associate the opportunity to become part of a mature and fully competent team. Pleasant and motivating work atmosphere. Please fax resume to (819) 845-7854. Dr. Jacques Vaillancourt, Windsor, near Sherbrooke. Tel. (819) 845-9014. D1371

QUEBEC - Gatineau: Located 10 minutes away from Parliament Hill in Ottawa. Associate required full time. Patient base provided. Completely free of clerical duties, assisted by an assistant and a hygienist, you will be practising dentistry in an enchanting environment with leading-edge equipment. Above-average remuneration. Contact: Louise, tel. (819) 246-0246, email centredentairelimbour@videotron.ca D1370

YUKON TERRITORY - Whitehorse: Associate required for a 5-chair dental clinic. We are looking for a person committed to quality dentistry and interested in a long-term relationship. In the new year we will require a highly motivated, patient-oriented hygienist as well. Tel. (867) 668-6077, fax (867) 667-6824. D592

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C O N F E R E N C E S

FLY FISHING DENTAL SEMINAR: South West Manitoba, Sept. 25-27. At the site of the Canadian Fly Fishing Championship. Speaker - Dr. John Nasedkin. For information tel. (701) 255-1311, fax (701) 224-1102, e-mail info@warfordorthodontics.com D1378

NORTHWEST DENTAL EXPOSITION 2003: Presented by the Edmonton and District Dental Society, Friday, Sept. 26, 2003. Featuring Gerald Kugel and keynote speaker Eveline Charles. Enquiries, tel. (780) 459-1275. D1360

Classified Ads

**MEETING OF THE GENERAL ASSEMBLY
INCLUDING THE ANNUAL GENERAL MEETING**

Friday, September 5, 2003

NOTICE OF MEETING

TAKE NOTICE that a meeting of the Canadian Dental Association's General Assembly, including Annual General Meeting (AGM) and Interactive Session, will be held on Friday, September 5, 2003, at the Westin Ottawa Hotel, 11 Colonel By Drive, Ottawa, Ontario, at 9 am.



George Weber
Executive Director & Secretary
Canadian Dental Association

STRATEGIC FORUM

Saturday, September 6, 2003

NOTICE OF MEETING

TAKE NOTICE that the Canadian Dental Association's Strategic Forum will be held on Saturday, September 6, 2003, at the Westin Ottawa Hotel, 11 Colonel By Drive, Ottawa, Ontario, at 9 am.



George Weber
Executive Director & Secretary
Canadian Dental Association

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CDA Fund Performance (for period ending May 31, 2003)

	MER	1 year	3 years	5 years	10 years
CDA CANADIAN GROWTH FUNDS					
Aggressive Equity fund (Altamira)	up to 1.00%	-9.1%	0.8%	0.5%	n/a
Common Stock fund (Altamira)	up to 0.99%	-12.4%	-9.5%	1.3%	5.4%
Canadian Equity fund (Trimark) ¹¹	up to 1.65%	-12.4%	2.4%	3.4%	8.1%
Special Equity fund (KBSH) ¹²	up to 1.45%	-15.7%	-18.7%	-0.2%	14.8%
TSX Composite Index fund (BGI)	up to 0.67%	n/a	n/a	n/a	n/a
CDA INTERNATIONAL GROWTH FUNDS					
Emerging Markets fund (KBSH)	up to 1.45%	-9.6%	-8.1%	0.7%	n/a
European fund (KBSH)	up to 1.45%	-26.8%	-22.0%	-7.8%	n/a
International Equity fund (KBSH)	up to 1.45%	-26.3%	-22.8%	-4.5%	n/a
Pacific Basin fund (KBSH)	up to 1.45%	-29.1%	-33.4%	-5.9%	n/a
US Equity fund (KBSH) ¹³	up to 1.20%	-24.0%	-19.6%	-0.8%	9.4%
Global fund (Trimark) ¹⁴	up to 1.65%	-14.6%	2.6%	4.9%	11.6%
Global Stock fund (Templeton) ¹⁵	up to 1.77%	-24.6%	-9.7%	n/a	n/a
S&P 500 Index fund (BGI) ¹¹	up to 0.67%	-18.2%	-14.1%	-3.0%	10.1%
CDA INCOME FUNDS					
Bond and Mortgage fund (Elantis)	up to 0.99%	9.8%	7.5%	5.6%	7.1%
Fixed Income fund (McLean Budden) ¹⁶	up to 0.97%	9.8%	8.3%	6.1%	8.1%
CDA CASH AND EQUIVALENT FUND					
Money Market fund (Elantis)	up to 0.67%	2.2%	3.4%	3.8%	4.2%
CDA GROWTH AND INCOME FUNDS					
Balanced fund (KBSH)	up to 1.00%	-6.4%	-5.4%	1.8%	6.7%
Balanced Value fund (McLean Budden) ¹⁷	up to 0.95%	-4.6%	2.5%	4.3%	8.3%

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

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

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

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



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*TM Warner Lambert Company, Inc. use Pfizer Canada Inc., Adams Division, Toronto ON M1L 2N3.

