CJRDP JCDRP

Canadian Journal of Restorative Dentistry & Prosthodontics

The official publication of the Canadian Academy of Restorative Dentistry and Prosthodontics

Journal canadien de dentisterie restauratrice et de prosthodontie

Publication officielle de l'Académie canadienne de dentisterie restauratrice et de prosthodontie

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VOLUME 2-3
SUMMER / ÉTÉ 2009

PEER-REVIEWED – JOURNAL - REVUE DES PAIRS

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Canadian Journal of
Restorative Dentistry & Prosthodontics
Journal canadien de
dentisterie restauratrice et de prosthodontie

VOL. 2, NO. 3 • SUMMER / ÉTÉ 2009

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Publication officielle de L'Académie canadienne de dentisterie restauratrice et de prosthodontie

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MESSAGE FROM THE **EDITOR-IN-CHIEF**
MESSAGE DU **RÉDACTEUR EN CHEF**

Continuing Education:

Perceptions and Rewards

School graduations are often the first occasions to hear about our own continuing education. We haven't even set foot outside university confines and the dean is already telling us, in his allocution, that we owe it to our patients and to ourselves to be perpetual students. Yet there we are, thinking that we're out of the woods, eagerly expecting to navigate through life and career without any further assistance.

Ah, but! We soon learn that we are being closely watched from all sides! Professional and government authorities, not to mention the public at large, expect us to be competent and up to date, among other virtues. Lifelong learning isn't a new concept, by any means. Confucius, More, Dewey, Rousseau, and so many others, consider lifelong learning essential to the pursuit of happiness. One cannot approach happiness without improving oneself and one cannot improve without change. And one cannot change without … education.

So even though buzzwords like globalization and specialization are incentive enough to want to pursue one's knowledge in any given field, such intangibles as openness, curiosity, self-improvement, and understanding are the real deal clinchers.

Today's dental practitioner can expect to dedicate at least 1,000 hours to continuing education (CE) in the course of his/her professional life. Countless CE activities and venues are offered to us. Have you checked the Web lately? Why, we could conceivably stay home and let the so-called courses come to us, if we wanted to. There's no shortage of passive, path-of-least-resistance content being peddled out there.

But there comes a time when most of us feel the need to reach out and get involved in our own development, interact with our peers, tweak our proficiencies. Study clubs are a case in point.

For many, such worthy local endeavours naturally lead to the next level, whereby the practitioner strives to share, contribute, and exchange knowledge with colleagues outside the immediate clinical surroundings. This impulse to get involved on a wider scale reflects a desire to establish universal consensus on clinical procedures, materials and technologies and impact the profession per se.

Professional associations, through their scientific programs, offer such opportunities to their members, to pursue their ideals, to take from and give their respective expertise to their colleagues.

A Jobboom Internet survey[1] (1,763 respondents) in the Province of Québec had the public identify the best 25 jobs. Dentistry was their number one choice due to the following criteria, by order of importance: (1) Professional development; (2) Autonomy; (3) Income; (4) Decision making participation; (5) Team work; and (6) Flexible schedules. Not bad! It is obvious that our patients perceive dental profession-

als as enjoying a stimulating and interesting work environment. If it weren't for dentists projecting their continuing professional enthusiasm through professional development, how else would the public know what a terrific profession ours is?

Herein, you will read Mr. Jacques Marois' second practice management article on dental leadership describes the attributes of the Magician and Fairy archetypes, and their ongoing thirst for discovering and learning. The author explains the pivotal role each archetype plays in human resource and management skills.

Dr. Bruce Kleeberger's case reports in "Using Provisional Restorations to Guide Tissue Healing for Predictable Prosthetic Aesthetics" details the efficient manner of planning and executing temporary restorations for varied clinical situations in order to shape the gingival tissue for optimal health and esthetics.

Computer assisted implant surgeries are becoming a common and widespread practice standard. Dr. Domenic Morielli, using case reports, demonstrates the advantages and the learning curve associated to this contemporary standard of care.

In Dr. Begüm Akkayan et al's dental material *in vitro* study, "The Effect of Different Surface Treatments on the Bond Strength of Two Esthetic Post Systems," quartz fiber-reinforced and zirconium posts are evaluated in regards to bond strengths that various available chairside surface treatments can provide when using MPD containing resin cement. Resulting SEM data from push-out tests are analyzed and de-bonding failure patterns are compared.

This issue invites you, members and guests, to our Annual Scientific Meeting and Social Program that will be held in vibrant Montréal come September. Moreover, a welcome initiative in the form of simultaneous translation has been made available on site.

In addition to the academy's top-notch scientific program, this Montréal meeting offers a pre-meeting CAD/CAM course, numerous social and sport activities and industry exhibits that are sure to make this restorative and prosthodontics meeting *the* continuing education experience of the year! Be sure to stop by the CJRDP/JCDRP desk to meet your editorial team.

1 Le plus beau métier Dentiste; Le Journal de Québec 2008;XLI(357):1–4.

Dr. Hubert Gaucher
Editor-in-Chief

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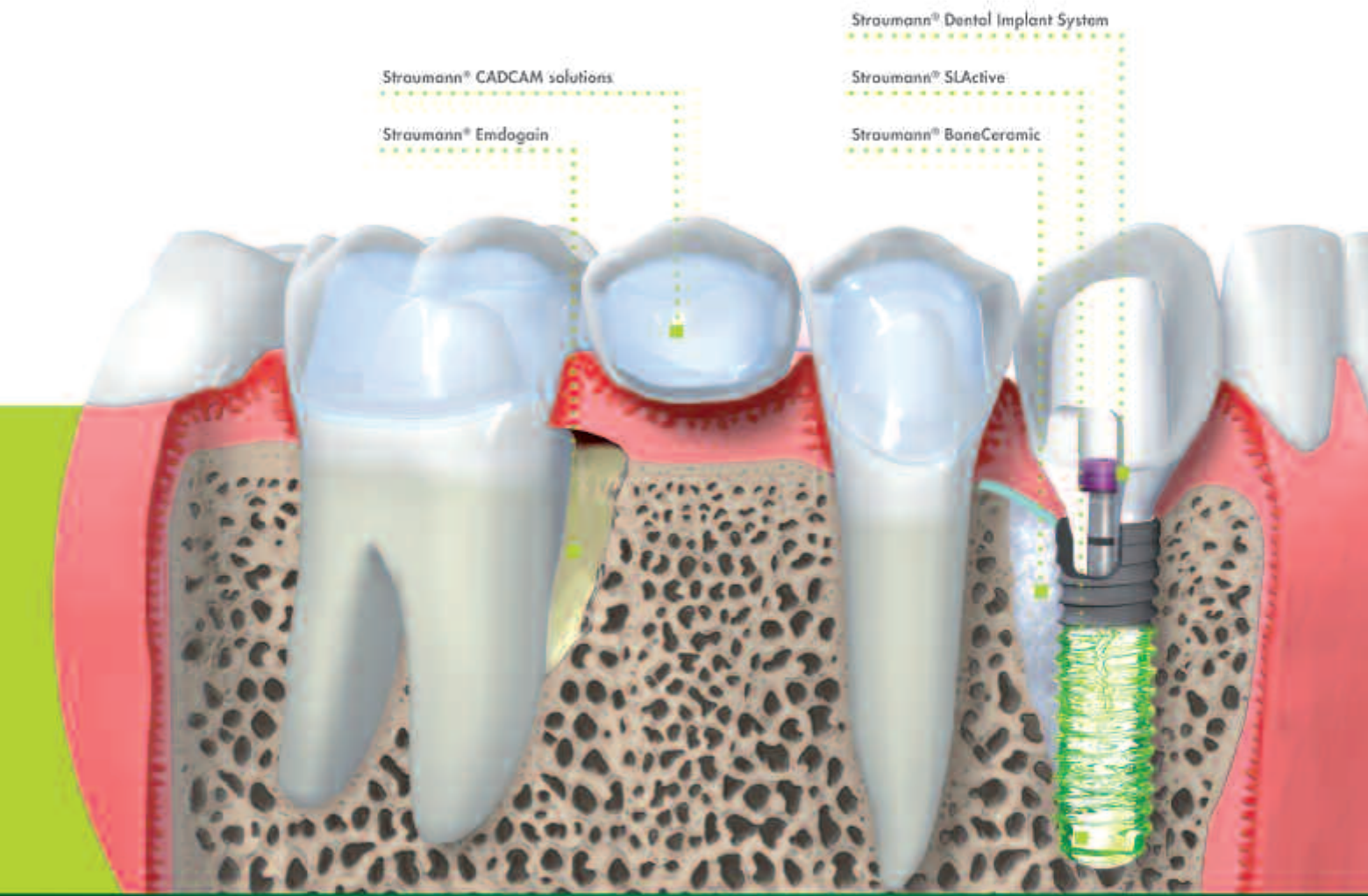

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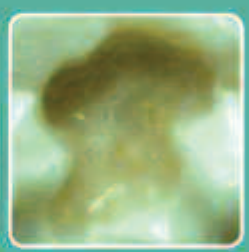

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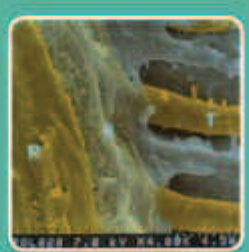

Stable Hybrid layer

Immediate Dentin Sealing (IDS) Technique
Clinical Advantages

- **Patient Comfort** – less sensitivity during provisonalization, limited need for anesthesia during final cementation, reduced post-op sensitivity.
- **Maximum Tooth Structure Preservation** – increased retention for short clinical crowns & tapered preps.
- **Stable Hybrid Layer** that will resist collapse during final cementation.
- **Eliminates The Need** for use of temporary cements.

Magne, Pascal, DMD, PhD, "Immediate Dentin Sealing: A Fundamental Procedure for Indirect Bonded Restorations," Inside Dentistry, April 2006, 20-25.

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CJRDP JCDRP

VOLUME 2 • ISSUE 3

Content/Sommaire

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FEATURES/ARTICLES

About the Cover
Marché Bonsecours, opened in 1847. It once housed Montreal City Hall between 1852 and 1878 and also briefly accommodated the Parliament of United Canada in 1849. Today, the market houses outdoor cafés, restaurants and boutiques.

Au sujet de la page couverture
Le Marché Bonsecours a ouvert ses portes en 1847. Entre 1852 et 1878 il abritait l'Hôtel de ville de Montréal puis, brièvement, le Parlement du Canada Uni en 1849. Aujourd'hui le site rassemble cafés, restaurants et boutiques.

INDICATES PEER REVIEWED/
INDIQUE REVUE DES PAIRS

Éducation continue :
Perceptions et récompenses

Bien souvent, c'est au cours de la remise des diplômes que l'on entend parler d'éducation continue. N'ayant pas encore exploré le monde du travail, le Doyen de notre Faculté nous révèle déjà dans son allocution que nous devons continuer d'étudier pour le bienfait de nos patients et pour nous-mêmes. Nous sommes là, croyant que le pire est déjà passé, et que nous pourrons maintenant poursuivre notre vie et notre carrière sans aide aucune.

Hélas non! Nous ne tardons pas à reconnaître que nous sommes surveillés de tous côtés. Les organismes professionnels et les instances gouvernementales, sans oublier le public, s'attendent entre autres, à ce que nous puissions faire preuve de compétence et être à jour dans nos connaissances.

L'éducation qui s'étend sur une vie entière n'est pas un concept nouveau. Pour Confucius, More, Dewey, Rousseau et bien d'autres encore, la formation continue est essentielle à la poursuite du bonheur. On ne peut espérer le bonheur sans s'améliorer soi-même et on ne peut s'améliorer sans changement. Et sans l'éducation…on ne peut changer.

Même si les mots du jour, tels globalisation et spécialisation nous incitent à vouloir approfondir nos connaissances dans un domaine donné, les aspects intangibles, comme l'ouverture d'esprit, la curiosité, l'autoamélioration et la compréhension, en demeurent les vrais arguments décisifs.

De nos jours, le praticien dentaire peut s'attendre à consacrer au moins 1 000 heures en éducation continue durant sa vie professionnelle. De nombreuses activités d'éducation continue nous sont offertes. Avez-vous navigué le Web récemment? Nous pouvons maintenant prendre toutes sortes de cours dans le confort de notre demeure si nous le voulons. Ce ne sont pas les cours de moindre effort qui manquent.

Mais il vient un temps lorsque la plupart d'entre nous ressentons le besoin de jouer un rôle actif dans notre propre développement, d'interagir avec nos collègues et confrères et de perfectionner nos compétences. Les cercles d'études en sont un exemple type.

Pour plusieurs, de telles entreprises méritoires mènent naturellement à un autre niveau, où le praticien vise à partager, collaborer et échanger ses connaissances avec ses collègues en dehors de son milieu clinique immédiat. Cette motivation à vouloir s'impliquer reflète un désir d'établir un consensus universel sur les procédures cliniques, le matériel et les technologies, et aussi d'avoir un impact sur la profession proprement dite.

Les associations professionnelles, par l'entremise de leurs programmes scientifiques, offrent la possibilité à leurs membres de poursuivre leur idéal, d'apprendre de leurs collègues et également de partager leurs connaissances et compétences avec ces derniers.

Dans un sondage sur l'Internet[1] mené par Jobboom (1763 répondants) au Québec, on demandait d'identifier les 25 meilleures professions. La Médecine dentaire est arrivée au premier rang en raison des critères suivants, par ordre d'importance : (1) développement professionnel; (2) autonomie; (3) revenu; (4) participation à la prise de décision; (5) travail d'équipe; et (6) horaire flexible. Pas si mal! Il est évident que nos patients perçoivent que les professionnels dentaires trouvent leur milieu de travail intéressant et stimulant. Si ce n'était pas des dentistes qui projettent leur enthousiasme constant par le perfectionnement professionnel, comment le public saurait-il que notre profession est si formidable?

Vous pourrez lire ci-après le deuxième article de gestion de la pratique sur le leadership rédigé par

Monsieur Jacques Marois. Il décrit les qualités des archétypes du magicien et de la fée et leur soif de découverte et d'acquisition du savoir. L'auteur explique le rôle de base que chaque archétype joue dans les ressources humaines et les compétences en gestion.

Les rapports de cas du Dr Bruce Kleeberger dans « L'utilisation des restaurations provisoires pour guider la cicatrisation pour une prosthodontie prévisible » discutent de la manière efficace de planifier et d'effectuer des restaurations temporaires pour divers cas cliniques afin de façonner le tissu gingival pour une santé optimale et une meilleure esthétique.

Les chirurgies implantaires assistées par ordinateur sont de plus en plus courantes. Le Dr Domenic Morielli, en se servant de rapports de cas, démontre les avantages associés à cette technologie contemporaine.

Dans l'étude *in vitro* sur le matériel dentaire intitulée « L'effet de différents traitements de surface sur la force de liaison de deux systèmes de pivots esthétiques », le Dr Begüm Akkayan et ses collaborateurs ont évalué des pivots renforcés au quartz et en zirconium se rapportant à la force de liaison que divers traitements de surface disponibles peuvent fournir lorsqu'on utilise de la résine contenant du MDP. Les données obtenues par microscopie électronique à balayage (MEB) des épreuves de contrainte par expulsion sont analysées et les essais ratés de liaison sont comparés.

Nous profitons de l'occasion dans ce numéro pour convier les membres et leurs invités à assister à notre Congrès scientifique annuel ainsi qu'au programme social qui auront lieu à Montréal en septembre. De plus, les participants pourront profiter de la traduction simultanée mise à leur disposition.

En plus du programme scientifique de premier plan de l'Académie, un cours de CAO/FAO sera offert avant le Congrès à Montréal, en plus d'activités sociales et sportives et des expositions qui feront de cet événement la meilleure expérience en formation continue de l'année! Ne manquez pas de venir rencontrer l'équipe de rédaction de CJRDP/JCDRP.

1 Le plus beau métier Dentiste; Le Journal de Québec 2008;XLI(357):1–4.

Dr Hubert Gaucher
Rédacteur en chef

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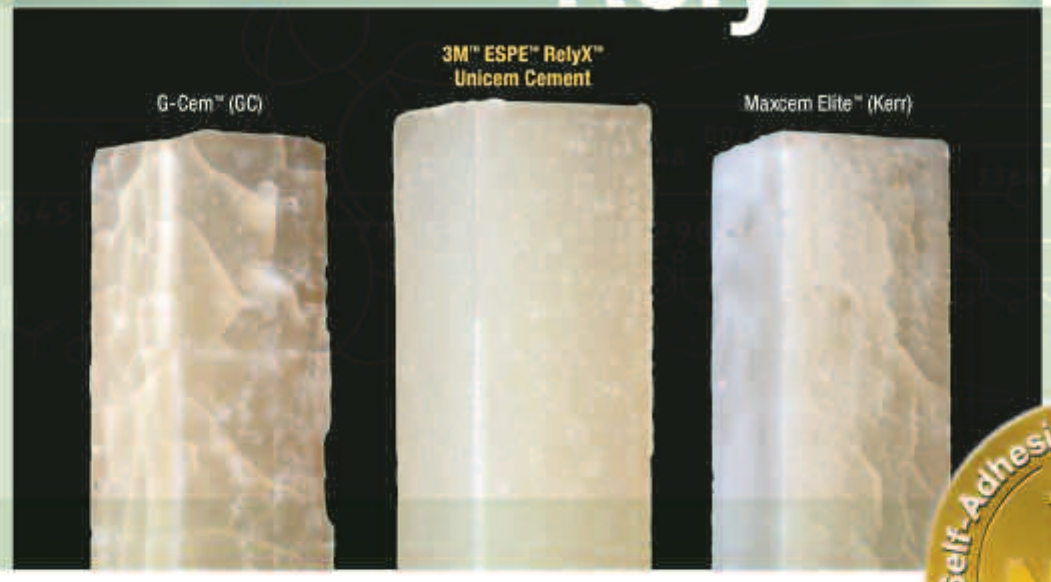

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The Elipar S10 LED curing light from 3M ESPE possesses a unique, ergonomic V-shape body that provides a comfortable grip from various angles, allowing any user's technique to be best accommodated. Along with superior aesthetic appeal, the small size offers an excellent weight balance. The shield of the device serves as a flat surface rest for roll-off protection; and the wand is cordless, making handling and performing procedures easier. In addition to the extraordinary steel design and improved maneuverability, the Elipar S10 LED curing light from 3M ESPE has an innovative *magnetic* light guide fixture for quick attachment and removal of the light guide, allowing for easy insertion, removal and positioning.

With the capacity to operate in complete silence, the Elipar S10 LED curing light from 3M ESPE includes a switch-off option for timer and beep signals, and does not house a noisy fan. A unique timer on the device offers a range of five, 10, 15, 20, and 120 second cure modes, and a tack-cure mode. The tack-cure mode gives reproducible one-second light pulses in response to pushing and holding down the trigger button, making removal of excess cements easier, safer and more predictable.

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The Elipar S10 LED curing light from 3M ESPE operates with a high-performance Lithium-ion battery that can be easily inserted and removed, much resembling a flashlight. The battery allows light output to remain consistent throughout its charge, and does not weaken during prolonged curing procedures. This advanced battery technology provides 60 minutes of cure time before recharging is needed. Although heat management is typically challenging in high-power devices that do not have a fan, continuous runtime is a benefit of the Elipar S10 LED curing light from 3M ESPE, as it can run a remarkable seven minutes in a sealed housing.

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Si vous avez un communiqué de presse à soumettre aux Nouvelles de l'Industrie, veuillez le transmettre à Scott Bryant, Gestion de la Rédaction: scottqbryant@aol.com

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- Eliminates the need for use of temporary cements

Magne, Pascal, DMD, PhD, "Immediate Dentin Sealing: A Fundamental Procedure for Indirect Bonded Restorations," *Inside Dentistry* 2006;20–25.

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ProDrive Systems Announces Three New Dealers to North American Distribution Channel

ProDrive Systems announces distribution among nine dealers within the American Dental Cooperative.

Montreal, June 29, 2009 ProDrive Systems announced today the addition of three new dental suppliers to the coast-to-coast network of US distributors. A1 Handpiece Specialists, Dailey Dental Supply and Hewitt Dental represent the newest members of the American Dental Cooperative to distribute ProDrive products (handpieces, burs and upgrade replacement turbines for leading brand handpieces).

The growing demand for ProDrive among the American Dental Cooperative (ADC) demonstrates the success and overwhelmingly positive response from customers. Richard St-Pierre, president and CEO of ProDrive Systems added, ProDrive continues to surpass every benchmark since our commercial launch in January 2009. Not only do we offer a game-changing product that will revolutionize dentistry, we also offer our dealers extensive technical training, sales support and a collaborative marketing program. The support of our dealer network is among the reasons why ProDrive has sustained extraordinary growth and success.

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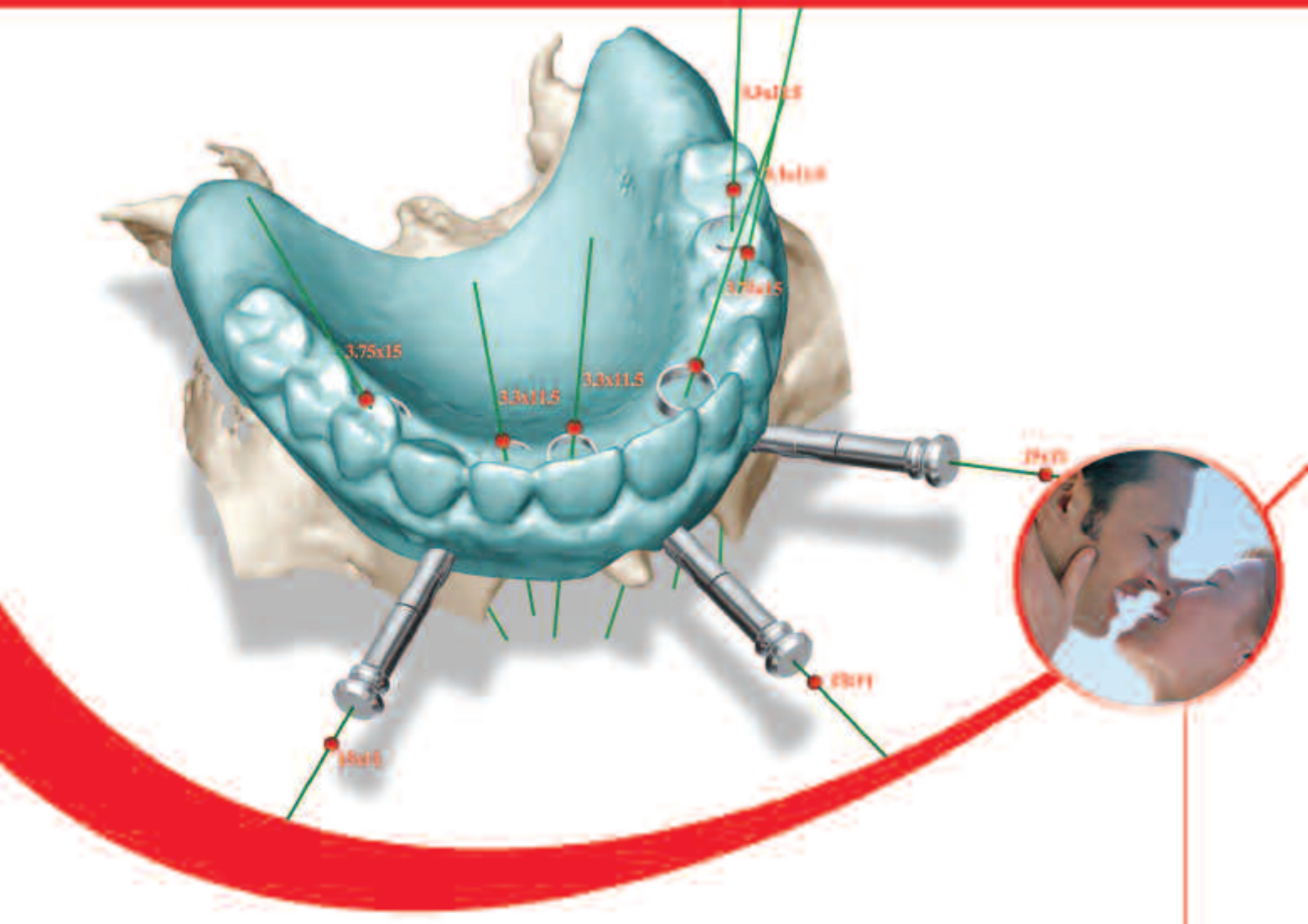

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CARDP ACDRP

2009 Joint Scientific Meeting

September 24th - 26th, Montréal, Québec

APC

CEREC® AC Bluecam technology: better serving today's dentistry

Presented by: DR. Claude Martel, *DMD, ISCD certified instructor*, St-Lambert, Québec

Le Westin Hotel, Thursday, September 24, 2009 - 1:00 pm– 5:00 pm - Fee $ 295.00 (Space is Limited)

This presentation proposes an overview of in-office chairside and outsourced prosthetic dentistry using CEREC® AC Bluecam CAD CAM device from Sirona, through the eyes of an end-user with 12 years experience and over 8000 single unit restorations done. Integration and learning curve issues will be discussed throughout the presentation, as the speaker has trained dentists and staff for the past 10 years to the CEREC method.

Learning objectives :

- To gain a **historical perspective** from chairside CAD CAM, why it was created, and how 23 years of clinical studies on performance and in vivo behaviour dictate the future of this technology
- To understand the **scope of application** useful to the clinician to create conservative, tooth-strengthening esthetic ceramic restorations as a primary means of restoring worn and coronally challenged posterior teeth
- Understand the **clinical advantages** of chairside single visit delivery of indirect restoratives for both patient and clinician
- Establish the **limitations** and which conditions are favourable to the use of CEREC® AC Bluecam in the dental office;
- Gain a clear picture of restorative options proposed by CEREC® AC Bluecam ;
- Understand the different **design options** for control of occlusal function and overall contour of a milled restoration through construction modes available for CEREC® AC Bluecam

Graduate of *l'Université de Montréal in 1988,* Dr. Claude Martel remains in private practice while being the CEREC instructor of the province of Quebec. He has been a key speaker in several events surrounding CadCam technology throughout the years and is the President of the Centre de formation CAD-CAM de l'Est du Canada, and co-founder of CERECVision.

Register - www.cardp.ca **Information - Info@cardp.ca** **Phone - 902-435-1723** **Fax: - 902-484-6926**

La technologie CEREC® AC Bluecam: au service de la dentisterie d'aujourd'hui

Claude Martel, *DMD, Instructeur accrédité ISCD,* St-Lambert, Québec

L'Hôtel Le Westin, jeudi, le 24 septembre, 2009 – 13h00 à 17h00 (Places limitées) ; Les frais 295,00$

Le but de cette présentation est d'offrir un survol de la méthode CEREC® AC Bluecam, le système de CAO/FAO au fauteuil développé par Sirona, du point de vue d'un utilisateur possédant plus de 12 ans d'expérience avec le système et ayant réalisé plus de 8 000 restaurations, en plus d'être formateur CEREC® certifié de l'ISCD depuis 10 ans.

Objectifs d'apprentissage de la présentation :

- en apprendre davantage sur l'historique de l'évolution de la technologie CEREC® AC Bluecam (qui l'a développée et pourquoi?) ;
- acquérir une connaissance des études cliniques en remontant aux premières années d'existence de la technologie CEREC® AC Bluecam ;
- comprendre les avantages cliniques et les limites du système CEREC® AC Bluecam au sein de la clinique dentaire ;
- découvrir les options de restauration des dents antérieures offertes par CEREC® AC Bluecam;
- comprendre les divers modes de conception offerts à l'utilisateur CEREC® AC Bluecam pour la réalisation d'une restauration dans le but de permettre le niveau de contrôle approprié sur la morphologie et l'occlusion
- en apprendre davantage sur les divers matériaux céramiques pour l'usinage des restaurations de même que sur le collage de ces restaurations

*Diplômé de l'Université de Montréal en 1988, le docteur **Claude Martel** pratique en clinique privée et a déjà produit plus de 8000 restaurations CEREC. Il est président du Centre d'éducation CAD-CAM de l'Est du Canada en plus d'être un membre actif du comité exécutif de l'Academy of CAD-CAM Dentistry.*

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The Canadian Academy of Restorative Dentistry and Prosthodontics
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CARDP ACDRP

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"Social Activities"

Social Program

Included in your Registration Package is Admission to the Opening Reception for Registrants and a Guest. Delegates also receive Continental Breakfasts, Refreshment Breaks, and Lunches on Friday and Saturday.

Thursday, September 24th

Kayaking on the Lachine Canal

7:00 am (Based on 5 Hours)
Registrant Event and/or Partner/ Guest Event
Join our experienced guides as the recount the long and fascinating history of this cradle of industrialization. You can paddle from downtown Montreal all the way to Lake Saint Louise. Opened in 1825 to facilitate shipping into the interior of North America, this 14.5 km long canal consists of five sets of locks stretching from its entrance above the Lachine Rapids to its exit in Montreal's Old Port. An excursion for all kayakers and alike, not to be missed!

Golf at Club de Golf de l'Ile de Montréal

Tee-Off Times starting at 8:50 am
Registrant and/or Partner/Guest Event
Within a few minutes from downtown Montréal prepare yourself to live a mystical voyage that will transport you back in time to the origins of this game. Created and designed by the famous architect Pat Ruddy, you will find yourself in Ireland without even having to hop on a plane. Play both our courses unique to Montréal. These incredible Irish influenced creations on Québec soil will leave no golfer indifferent. Ireland, within a few minutes from downtown! "Bon voyage"

Welcome Buffet at Le Westin Hotel

6:30 – 10 pm
Registrant and Partner/ Guest Event
Join your Meeting Sponsors and other registrants and guests to rekindle old acquaintances and make new ones. You will enjoy the sounds of The Jazz Latin Djam®. Under Rafik Mankarios' musical direction, the Jazz Latin Djam Trio will entertain us for the opening reception. This is a small part of a Bigger 17 musician band that is entirely dedicated to the music of Buddy Rich! Montreal Jazz at its best will be performed for your enjoyment.

Friday, September 25th

Partner/Guest Program
Old Montréal Walk and Luncheon on the Bateau-Mouche

9:30 am – 2:30 pm
Partner/Guest Event
After leaving the hotel we will enjoy a walk through a maze of narrow lanes and old buildings providing a perfect opportunity to discover Old Montréal's history and charm. With their exuberant display of architecture, the streets and buildings testify to Montreal's rich heritage and illustrate a period of its history. The tour will feature a number of remarkable restorations that have breathed new life into the Old Port: City Hall, the old markets and municipal buildings, the old business section, churches, Jacques Cartier Square. This tour will also include the visit of Notre-Dame Basilica, an outstanding example of néo-gothic architecture.

Experience Montréal – Free Evening
This evening will be on your own to join your Friends and Colleagues to explore the many culinary delights offered in the charming city of Montréal. There are many fine restaurants and eateries in Old Montréal, close to the Hotel.

Saturday, September 26th

President's Gala - Le Westin Hotel Montréal

6:30 pm - Registrant and Partner/Guest Event
Join us at the CARDP President's Gala, Saturday, September 26, 2009 at the Le Wéstin Hotel and Dance the Night Away to the Orchestra "La Gioventu" a top corporate and private party band. This Band started in 1979 and comes complete with members of international acclaim features Texan born singer, Alma Faye Brooks under the direction of Montreal born pianist and keyboard player, Louis Toteda. Alma has a diverse Jazz repertoire of legendary talents like Ella, Sara, Sinatra and Gershwin. La Gioventu's orchestra members are professional studio musicians with international experience. Their strong vocal qualities and elaborate musical talents have allowed them to work with top musicians around the world. Their talent and contribution to La Gioventu makes the orchestra unique and a leader in the entertainment industry.

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Soyez des-nôtres en septembre!

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Congrès conjoint 2009

24 au 26 septembre, Montréal, Québec

APC

Activités sociales

Programme social

Votre inscription inclut la réception de bienvenue pour le participant inscrit et son invité. De plus, vous avez droit aux petits-déjeuners continentaux, aux rafraîchissements durant les pauses, ainsi que les déjeuners du vendredi et du samedi.

Jeudi 24 septembre

Kayak sur le Canal Lachine

07h00 (durée 5 heures)
Pour participants inscrits au congrès et leurs invités
Joignez-vous à nos guides expérimentés qui vous raconteront l'histoire captivante du berceau de l'Industrialisation. Vous pourrez pagayer du centre-ville de Montréal jusqu'au Lac Saint-Louis. Ce canal de 14,5 km de long, ouvert en 1825 pour faciliter le transport maritime vers l'intérieur de l'Amérique du nord, consiste en cinq écluses partant des Rapides de Lachine pour aboutir dans le Vieux Port de Montréal. Une excursion en kayak des plus mémorables. À ne pas manquer!

Golf au Club de golf de l'Île de Montréal

Les départs débutent à 08h50
Pour participants inscrits au congrès et leurs invités
À peine à quelques minutes du centre-ville de Montréal, vous vous retrouverez transporté aux origines du sport, en Irlande, sans même avoir à prendre l'avion. Les deux parcours ont été créés par le réputé architecte Pat Ruddy et sont uniques à Montréal.

Buffet de Bienvenue à Le Westin Montréal

18h30 – 22h00
Pour participants inscrits au congrès et leurs invités

Collègues, commanditaires et invités auront l'occasion de renouer ou de former de nouvelles affinités. Vous apprécierez la musique du Jazz Latin Djam Trio.

Sous la direction musicale de Rafik Mankario, ce trio nous divertira durant la réception d'ouverture. Il constitue une petite portion d'un ensemble de 17 musiciens entièrement dédiés à la musique de Buddy Rich.

Vendredi 25 septembre

Promenade dans le Vieux Montréal et repas sur le Bateau-Mouche

09h30 – 14h30
Programme pour partenaires

En quittant notre hôtel nous nous promènerons dans un labyrinthe de rues et ruelles afin de découvrir l'histoire et le charme du Vieux Montréal qui témoigne de son illustre et riche héritage. Plusieurs restaurations remarquables seront soulignées dans le Vieux Port: l'Hôtel de Ville, les marchés et édifices municipaux, le secteur financier, des églises, le Square Jacques-Cartier. Le tour incluera une visite à la Basilique Notre-Dame, un joyau de l'architecture néo-gothique.

Vivez Montréal – Soirée libre

Votre soirée vous est réservée afin que vous puissiez vous joindre à collègues et amis et découvrir les délices culinaires que Montréal peut offrir. Le Vieux Montréal ne manque pas d'excellents restaurants, non loin de votre hôtel.

Samedi 26 septembre

Gala du président – Le Westin Montréal

18h30 - Pour participants inscrits au congrès et leurs invités

Soyez des-nôtres pour le Gala du Président de l'ACDRP samedi le 26 septembre 2009 au Le Westin et dansez à la musique de La Gioventu, un orchestre qui se spécialise dans les événements corporatifs privés. Ses membres sont de calibre et d'expérience internationale incluant la réputée chanteuse de Jazz du Texas, Alma Faye Brooks, sous la direction du pianiste montréalais Louis Toteda. Alma possède un répertoire de jazz diversifié de légendes telles Ella Fitgerald, Sarah Vaughn, Frank Sinatra et plusieurs autres.

Vérifier le site internet pour les mises à jour continues sur les Réunions Scientifiques !

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Join us in Montréal this September!

CARDP ACDRP

2009 Joint Scientific Meeting

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Meeting Theme: "Tomorrow's Dentistry Today"

Hands-On Course - Dr. Claude Martel
Topic: ***CEREC® AC Bluecam technology: better serving today's dentistry***

Meet Our Friday Speakers!


Dr. Lesley David & Dr. John Zarb
Topic: **Current Concepts in Computer Guided Implant Solutions**

Dr. Pierre Boudrais
Topic: **The evolution of ceramic restorations: Zirconia**

Dr. Paulino Castellon
Topic: **The Effects of CAD-CAM and CT Guided Technology with Patient Care**

Dr. Ashok Oommen
Topic: **Health is Wealth: You're Richer Than You Think!**

Dr. Stefan Holst
Topic: **Advances in Digital Dentistry with Trend-Setting Restorative Solutions and Treatment Options For All Indications**

Dr. Izchak Barzilay
Topic: **Is This Implant Integrated / Can This Implant Be Saved?**

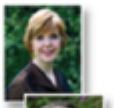
Meet Our Saturday Speakers!

Dr. Hubert Gaucher
Topic: **Clinical Trials and Clinical Choices**

Dr. Francine Albert
Topic: **Anterior porcelain veneers: what is the current evidence?**

Saturday Speakers!

Dr. Jean Francois Brochu
Topic: **The Impact of Advances in Imaging Technology on Implant Therapy**




Dr. Christian von Rosenbach and Anne von Rosenbach
Topic: **Evidence Based Dentistry in a do it Yourself World**

Mr. Peter Barry
Topic: **The Amazing Power of "Listening" (The 21st Century Formula for Success)**

Dr. Michael Auerbach
Topic: **Endo?? Implant?? An Endodontic Perspective**

Dr. Mark Spatzner
Topic: **Periodontal Ligament vs. Titanium: Why, when and how to convert**

Dr. Frederick Muroff
Topic: **Potential Periodontal Effects of Orthodontic Treatment**

Dr. Bobby Baig & Dr. Marion Rotella
Topic: **"Clinically Relevant Research In Prosthodontics"**

Registrants will have access to the Sponsor Trade Show, Scientific Meetings and Saturday Table Clinics. 12 CE Credits will be issued for your attendance at the Scientific Meetings.

There will also be Hands On Course conducted by Dr. Claude Martel. 4 CE credits will be issued upon successful completion of the course.

Check the CARDP website for ongoing updates on the Scientific Meeting!

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24 au 26 septembre, Montréal, Québec

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Le thème est 'La dentisterie de demain...aujourd'hui'

Cours pratique Dr Claude Martel
La technologie CEREC® AC Bluecam: au service de la dentisterie d'aujourd'hui

Rencontrez nos conférenciers du vendredi


Dr. Lesley David & Dr. John Zarb
Sujet: **Conceptualisation contemporaine de solutions implantaires assistées par ordinateur**

Dr. Pierre Boudrais
Sujet: **L'évolution des restaurations toutes céramiques: le Zircon**

Dr. Paulino Castellon
Sujet: **Les effets de la CAO/FAO et de la tomographie numérique sur les soins**

Dr. Ashok Oommen
Sujet: **Santé égale richesse: vous êtes plus riche que vous ne le croyez**

Dr. Stefan Holst
Sujet: **Progrès en dentisterie numérique offrant des solutions restauratrices d'avant-garde et des plans de traitements pour toutes situations**

Dr. Izchak Barzilay
Sujet: **Cet implant est-il ostéointégré/Peut-on le récupérer?**

Rencontrez nos conférenciers du Samedi

Dr Hubert Gaucher
Sujet: ***Essais cliniques et choix cliniques***

:
Dr Francine Albert
Sujet: ***Les facettes de porcelaine antérieures: quels sont les faits courants?***

Rencontrez nos conférenciers du Samedi

Dr Jean Francois Brochu
Sujet: **L'impact des avancements de la technologie digitale sur les traitements implantaires**


Dr Christian von Rosenbach & Anne von Rosenbach
Sujet: ***La dentisterie factuelle dans un monde autosuffisant***

Mr Peter Barry
Sujet: ***La puissance remarquable de prêter l'oreille (La formule du succès au 21ième siècle)***

Dr Michael Auerbach
Sujet: ***L'endo? L'implant? Un point de vue endodontique***

Dr Mark Spatzner
Sujet: ***Le ligament parodontal vs le Titane: Pourquoi, quand et comment faire la transition***

Dr Frederick Muroff
Sujet: ***Les effets parodontaux potentiels des traitements orthodontiques***

Dr Bobby Baig & Dr Marion Rotella
Sujet: ***La Recherche d'un point de vue clinique Pertinente Dans Prosthodontics***

Les participants auront accès à l'exposition des commanditaires, aux sessions scientifiques et aux cliniques de table et seront accordés 12 crédits d'éducation continue pour leurs présences aux sessions scientifiques.

Aussi un cours pratique sera donné par Dr Claude Martel. Quatre crédits d'éducation continue seront accordés à ceux qui participeront au cours.

Vérifier le site internet pour les mises à jour continues sur les Réunions Scientifiques !

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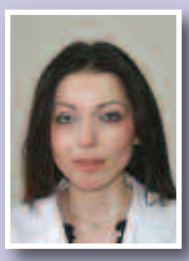
The Effect of Different Surface Treatments on the Bond Strength of Two Esthetic Post Systems

By Begüm Akkayan, DDS, PhD, Burcu Şahin, DDS, and Hubert Gaucher, DDS, MScD

ABSTRACT

The purpose of this study was to evaluate the effect of different surface treatments on the bond strength of fibre-reinforced and zirconium posts cemented with MDP-containing resin cement (methacryloyloxydecyl dihydrogen phosphate). Eighty intact, maxillary human canines were selected for this study. The crowns of each root were sectioned 2 mm above the cemento-enamel junction. Following endodontic treatment, the roots were divided into two groups of 40 teeth. Root canal preparations were performed for quartz fibre-reinforced posts, (DT Light Post) (n = 40) and zirconium posts (CosmoPost) (n = 40). The groups were further divided into four subgroups in order to receive the following three different surface treatments: (1) Airborne particle abrasion with Al2O3 of 50 μm diameter (AIRB), (2) Silane coupling agent application (SIL), (3) Tribochemical silica coating (TSC). The posts of the fourth subgroups received no treatment and served as control groups. Following cementation, the roots were embedded into acrylic resin moulds and each root was cut horizontally to produce four 2-mm-thick sections through post-dentin specimens. Push-out tests were performed at a cross-head speed of 0.5 mm/min. Data analysis was made with one-way ANOVA and multiple comparison tests. Characteristic de-bonded failure surfaces were examined with a scanning electron microscope (SEM). The highest bond strength values were obtained with tribochemical silica coating (TSC groups) for

Begüm Akkayan, DDS, PhD



Burcu Şahin, DDS

Hubert Gaucher, BA, DDS, MScD

About the Authors

Begüm Akkayan, DDS, PhD, is professor, Department of Fixed Prosthodontics, Faculty of Dentistry, Istanbul University, Istanbul-Turkey. Her fields of interest are esthetic post systems, adhesives, and all-ceramic systems. She can be reached at: bakkayan@yahoo.com.

Burcu Şahin, DDS, is a PhD student, Department of Fixed Prosthodontics, Faculty of Dentistry, Istanbul University, Istanbul-Turkey. She can be reached at: tem711980@hotmail.com.

Hubert Gaucher, BA, DDS, MScD, is the scientific director of the Canadian Dental Research Institute (CDRI/ICRD). He can be reached at: hubertgaucher@cdri-icrd.ca.

both of the post systems tested. Airborne particle abrasion (AIRB group) resulted with the second highest bond strength value in quartz fibre-reinforced post groups. No significant differences were recorded for the quartz fibre-reinforced post group which received silane coupling agent (group SIL) compared with the control group ($p > .05$). Within the limitations of this in vitro study it can be concluded that different surface treatments and physical characteristics of the post systems have an effect on the bond strength of quartz fibre-reinforced and zirconium posts cemented with adhesive resin cements. The results of this study could also serve as effective measures for clinical applications.

RÉSUMÉ

Le but de cette étude est d'étudier l'effet des différents traitements de surface sur la force de la liaison renforcée par des fibres des tenons et les tenons de zirconium consolidés avec du liant de résine synthétique contenant du DPM (Dihydrogèno phosphate methacryloyloxydecylique). Quatre vingt supérieures canines humaines sont sélectionnées pour cette étude. Les couronnes de chaque racine sont sectionnées de 2 mm au dessus de la jonction amélo-cementaire. Suite au traitement endodontique, les racines sont divisées en 2 groupes de 40 dents. Les préparations des canaux radiculaires ont été faites pour recevoir des tenons quartz renforcés par des fibres, (DT Light Post) ($n = 40$) et des tenons de Zirconium (CosmoPost) ($n = 40$). Les groupes ont été encore divisés en quatre sous groupes afin de recevoir les trois différents traitements de surface suivants : (1) Abrasion aéroportée des particules avec le Al_2O3 de 50 μm de diamètre (AIRB), (2) Application de l'agent de couplage Silane (SIL), (3) Revêtement en silice Tribochimique (RST). Les tenons du quatrième sous groupe n'ont pas reçu de traitement et ont servit comme groupe de contrôle. Après scellement, les racines ont été enfouies dans des moules en résine acrylique et chaque racine a été coupée horizontalement pour produire quatre sections d'épaisseur de 2-mm à travers des spécimens post dentines. Les épreuves de contraintes par expulsion ont été réalisées à une vitesse de 0.5 mm/min. L'analyse des données a été réalisée avec ANOVA à sens unique et de multiples épreuves comparatives. Les caractéristiques des cautionnées surfaces sont examinées avec un microscope électronique à balayage (MEB). Les valeurs les plus élevées de la force des liaisons sont obtenues avec le revêtement en silice tribochimique (Groupe RST) pour les deux systèmes des tenons testés. L'abrasion aéroportée des particules (Le groupe AIRB) a obtenu la deuxième plus haute valeur de force de la liaison dans le groupe de tenons quartz renforcés de fibres. Aucune différence significative n'a été enregistrée dans le groupe de tenons quartz renforcés de fibres qui ont reçu l'agent de couplage silane (groupe SIL) comparativement au groupe de contrôle ($p > .05$). Malgré les limitations de cette étude in vitro, on peut conclure que les différents traitements de surface et les caractéristiques physiques des systèmes de tenons ont un effet sur la force de la liaison renforcée par des fibres et les tenons de zirconium consolidés avec du liant de résine synthétique. Les résultats de cette étude peuvent aussi servir comme mesures efficaces pour les applications cliniques.

Current esthetic post materials, such as fibre-reinforced resin composite or zirconia, offer preferred optical properties for highly esthetic restorations. Zirconia posts, made from fine-grain dense tetragonal zirconium polycrystals (TZP), were developed in the late 1980s possessing high flexural strength and fracture toughness.[1–4] Glass- and quartz-fibre reinforced post systems, with elastic moduli comparable to that of dentin, were introduced later.[5–7] Fibre-reinforced post systems are mostly composed of a highly cross-linked polymer resin matrix, inorganic fillers, and reinforcing fibres of carbon, glass, or quartz.[8,9] Translucent quartz-fibre post systems were then introduced as a method to achieve optimal esthetic by allowing the use of adhesive systems and light-polymerized luting agents.[10]

These non-metallic posts, are intended to be adhesively bonded to the root canal. It has been reported that the adhesive resin cement systems have the ability to adhere to dentin and the post with a reinforcing effect.[11] The type of resin cement utilized had a significant influence on bond strengths to fibre reinforced posts.[12] Chemical affinity between post and luting material is extremely important for achieving high bond strength.[13] Different resin luting agents have been proposed for cementing tooth collared posts and can generally be divided into conventional bisphenol A glycidyl methacrylate

(BIS-GMA)- based resin luting agents and so-called adhesive resin luting agents containing functional monomers such as 10-methacryloxydecy dihydrogen phosphate (10-MDP).[14] The resin cements containing the adhesive monomer MDP are reported to demonstrate the ability to adhere to different types of restorative materials, including fibre posts.[14,15]

Failure of posts mainly includes debonding of the post, fracture of the root, and fracture of the post. Considering that debonding is a frequent type of failure with restorations of various post systems, the bond strength between posts and luting agent should be considered an important factor. Many studies have focused attention on different ways of improving the interfacial bond strength between posts and resin-based materials. The surface characteristics of esthetic posts, which can be modified through various techniques, have been reported to influence bonding of resin luting agents.[16–20]

The air abrasion modification is based on air-particle abrasion with different particle sizes. Recent studies have shown that airborne-particle abrasion with alumina particles changes the structure of the surface by plastic deformation and roughening, resulting in an increased surface area and a volume loss of material.[21,22]

The use of aluminum-trioxide particles modified with silica for airborne-particle abrasion was introduced in the late 1980s.[23] This procedure resulted in the embedding of the silica-coated alumina particles on the surface, thereby welding a silicate layer onto the surface by means of the high spot heat produced by the blasting pressure. This silicate-coated surface is chemically more reactive to resin when an application of the silane coupling agent is utilized. The CoJet system (3M ESPE, Seefeld, Germany) is a chairside system with an intraoral airborne-particle-abrasion device (DentoPrep; Ronvig, Daugaard, Denmark); the system includes a tribochemical coating of the surface with silica-modified aluminum-oxide particles (CoJet Sand; 3M ESPE) followed by silanization (ESPE Sil 3M ESPE). The Cojet treatment has been found to enhance the bond strength of resin cement to esthetic post systems of different composition.[20,24–26]

Silane coupling agents are hybrid organic-inorganic compounds and promote chemical bonding between dissimilar organic and inorganic materials through dual reactivity.[27–29] Inorganic groups of silane molecule form covalent siloxane bonds with the silica of the ceramic material; meanwhile, the organic functional part can polymerize with the organic matrix of the composite resin material.[30,31]

3-Methacryloyloxpropyltrimethoxysilane (3-MPS) is a commonly used silane molecule in dental applications.[32] The application of silane coupling agents also increase the surface energy and wetting ability of the surface.[33]

The purpose of this study was to evaluate the effect of different surface treatments on the bond strength of quartz fibre-reinforced and zirconium post systems cemented with MDP containing resin cement.

Material and Methods

Eighty maxillary canines extracted for periodontal reasons, with similar root length and free of cracks, caries, and fractures were selected and stored in 0.9% saline solution (Baxter Healthcare Corporation, Deerfield, IL). Teeth with excessive root curvature were not selected. All teeth were sectioned perpendicular to their long axes, 2 mm above the cemento-enamel junction with a low-speed saw (Isomet, Buehler Ltd, Lake Bluff, IL) utilizing water-cooling. The root canals were mechanically enlarged using endodontic files (Hero 642, Micro Mega SA, Geneva, Switzerland) operated at 400 rpm under a constant irrigation with 3% NaOCl. The enlarged canals were rinsed with distilled water, dried with paper points, and obturated with gutta-percha cones using lateral condensation (Gutta Percha Points, United Dental Mfgs, West Palm Beach, FL) using a eugenol-free sealer (AH 26, Dentsply DeTrey, Konstanz, Germany).

The post spaces were prepared 24 hours after completing endodontic procedures. Gutta-percha was removed with a warm endodontic plugger (Kerr Sybron Corp, Romulus, MI, USA) leaving 3 mm of the endodontic filling in the apical portion. Subsequently, the post spaces were prepared in two main groups of 40 specimens with the special preparation burs of each post system. The materials used in this study are presented in Table 1.

Size 3 quartz fibre posts were used for group 1 (n = 40) and zirconia posts of 1.70 mm in diameter were used in group 2 (n = 40) (Figure 1). Each group were further divided into four subgroups in order to receive the following three different surface treatments; (1) Group AIRB, Airborne particle abrasion with Al_2O_3 of 50 µm diameter at 2.8 bar pressure for 20 seconds from a distance of 10 mm, (2) Group SIL, Silane coupling agent application. Silane was applied with a brush and allowed to air dry for 5 minutes, (3) Group TSC, Tribochemical silica coating. The posts were abraded with an intra-oral airborne particle abrasion device using 30 µm silica modified Al_20_3 particles. The abrasive was applied perpendicular to the surface at 2.8 bar pressure from a distance of 10 mm for 20 seconds.

Figure 1. Esthetic post systems used; CosmoPost (left) – D.T. Light Post (right).

Table 1. Materials selected for this study

Material	Manufacturer	Type	Composition
CosmoPost	Ivoclar Vivadent, Schaan, Liechtenstein	Zirconia post	ZrO_2 90%,HfO_2 4.5%, $Y2O_3$ 5.4%, Al_2O_3 0.5%
DT Light Post	Bisco Inc., Schaumburg, IL	Translucent quartz fibre post	Quartz fibres 62% Epoxy resin 38%
Cojet Sand	3M ESPE, Seefeld, Germany	Tribochemical silica-coating particles	Silica modified Al2O3 particles of 30 µm
ESPE Sil	3M ESPE, Seefeld, Germany	Silane coupling agent	3-MPS, ethanol
Korox 50	Bego, Bremen, Germany	Sandblasting material	$Al2O_3$ particles of 50 µm 99.6%
Clearfil Porcelain Bond Activator	Kuraray Co Ltd, Osaka, Japan	Silane coupling agent	3-MPS, bisphenol-a-polyethoxy-dimethacrylate
Clearfil Liner Bond 2V	Kuraray Co Ltd, Osaka, Japan	Self-etching primer	Primer A and B:MDP, HEMA, hydrophilic methacrylate, dl-camphorquinone, N-diethanol-p-toluidine, H_2O
Clearfil Liner Bond 2V	Kuraray Co Ltd, Osaka, Japan	Light polymerizing bonding agent	Bonding A: BIS-GMA, HEMA, dl-camphorquinone, N-diethanol-p-toluidine, silanated colloidal silica
Panavia F 2.0	Kuraray Co Ltd, Osaka, Japan	Dual polymerizing resin luting agent	Paste A: Silanated silica, microfiller, MDP, dimethacrylates, photo/chemical initiator Paste B: Silanated barium glass, surface-treated NaF, dimethacrylates, chemical initiator

The post surfaces were then coated with the silane coupling agent of the Cojet system and allowed to air dry for 5 minutes. The posts of the fourth subgroups received no treatment and served as control groups. The experimental groups with different surface treatments are listed in Table 2.

All posts (n = 80) were marked at a distance of 12 mm from their respective apical ends. A line was drawn around the post at this level in order to standardize the cemented post lengths. All posts were cemented with the same adhesive system (Clearfil Liner Bond 2V, Kuraray Co Ltd, Osaka, Japan) and dual-polymerizing resin luting agent (Panavia F 2.0, Kuraray Co Ltd, Osaka, Japan). One drop of each primer A and B was mixed and applied to the post space walls with a microbrush (Microbrush X; Microbrush Corp, Grafton, WI) for 30 seconds. Excess primer solution was removed with paper points, and the primer was gently air dried. Bond A was applied with a microbrush, excess adhesive solution was removed with paper points, and the bonding agent was light polymerized for 20 seconds using a halogen light unit with 800 mW/cm² intensity (Optilux 501; Kerr/Demetron Research Corp, Danbury, CT) with the tip of the light unit directly in contact with the post space. For the cementation of the posts, equal amounts of a dual-polymerized resin luting agent paste base and catalyst were mixed and applied to the post space walls with a lentulo spiral instrument (Dentsply Maillefer, Ballaigues, Switzerland). The posts were then seated to full depth in the prepared spaces using finger pressure. The excess luting agent was immediately removed with a small brush. After the initial chemical polymerization, the resin luting agent was light polymerized for 20 seconds by transilluminating the posts, keeping the tip of the light unit in direct contact with the coronal end of the posts. After the cementation procedures, all

Table 2. Experimental groups with different surface treatments and esthetic post systems

Post Types	Surface Treatments	Luting Agent
ZIRCONIA n = 40	AIRB, airborne particle abrasion (n = 10)	PANAVIA F 2.0 n = 80
	SIL, silane coupling agent (n = 10)	
	TSC, tribochemical silica coating (n = 10)	
	CONT, no surface treatment (n = 10)	
QUARTZ FIBER n = 40	AIRB, airborne particle abrasion (n = 10)	
	SIL, silane coupling agent (n = 10)	
	TSC, tribochemical silica coating (n = 10)	
	CONT, no surface treatment (n = 10)	

specimens were stored in distilled water for 24 hours before testing.

Every sixth root was embedded into an acrylic resin mould using a specially designed rectangular shaped stainless steel supporter. Each resin mould was then attached to the arm of a low-speed diamond saw (Isomet; Buehler Ltd, Lake Bluff, IL) and sectioned perpendicular to the long axis under water-cooling. From each specimen, four post/dentin sections were obtained starting from the most cervical part of the root, each 2 mm thick. Due to the different apical designs of the experimental posts, 4 mm of post segments at the apical end were left aside. The exact upper and lower diameters of the post segments were determined using a digital micrometer (Mitutoya, Tokyo, Japan) with 0.01 mm accuracy according to this test design. Each study group of 10 roots provided a total of 40 test specimens.

Push-out testing was performed and the push-out bond strength values were calculated as per a previous study by Akgungör and Akkayan.[34] The post segments were loaded with a conical plunger, 1.1 mm in diameter, centered on the post (Figure 2). Loads were applied from an apical to cervical direction with a universal testing machine (Autograft AG-IS 5K-N Shimadzu, Kyoto, Japan) at a crosshead speed of 0.5 mm/min. The peak force, at the point of extrusion of the post segment from the test specimen, was taken as the point of bond failure and recorded in Newtons (N). Push-out bond strength values in MPa were then calculated by dividing this force by the bonded area of the post segment. Mean values were compared with one-way analysis of variance (ANOVA), followed by Tukey HSD test ($p > .05$) for post-hoc comparisons. Student's *t*-test was performed to assess the significance within groups.

Adhesive, cohesive and mixed types of failures, which occurred during de-bonding of the post sections at the post-resin-dentin interface, were determined and representative SEM (JSM 6400; JOEL, Tokyo, Japan) micrographs were taken.

Results

The mean push-out bond strength values and standard deviations (SDs) of the different groups are shown in Table 3 and Figure 3.

Among the surface treatments tested, the tribochemical silica coating (group TSC) resulted in the highest bond strength values for both of the post systems tested (21.24 ± 1.91 MPa zirconia / 24.62 ± 1.71 MPa quartz fibre). For quartz fibre reinforced posts, the second highest bond strength value was obtained with airborne particle abrasion (group AIRB) (20.08 ± 1.14 MPa) whereas the application of silane coupling agent (group SIL) had the second highest significant effect for zirconia post group (17.02 ± 1.61 MPa). The application of airborne particle abrasion (group AIRB) on zirconia posts (10.12 ± 1.23 MPa) and the application of silane coupling agent (group SIL) on quartz fibre reinforced posts (14.28 ± 1.66 MPa) had no significant effect compared to untreated post groups (group CONT) (10.68 ± 1.23 MPa zirconia / 13.96 ± 1.14 MPa quartz fibre).

Figure 2. The post segments were loaded with a conical plunger for the push-out test.

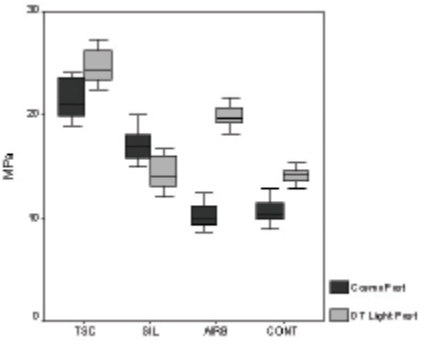


Figure 3. Mean push-out bond strength values and trust interval at 95% for all groups.

Group TSC, group AIRB, and group CONT demonstrated statistically higher bond strength values for quartz fibre reinforced post groups compared to zirconia post groups within the post group comparisons ($p < .001$). Group SIL was the only group that resulted in statistically higher bond strength values for the zirconia post group according to within-group comparisons ($p < .001$).

Discussion

The hypothesis of the present study was confirmed; i.e., the bond strengths to posts were significantly affected by the investigated surface treatments and posts of different composition.

Particle abrasion with alumina particles is used for many types of restorations and results in increased roughness of the surface and increased surface area.[21,22] Physical abrasion with alumina particles is a well established technique which generates a clean surface and introduces surface roughness and porosity. Such physical action is reported to increase surface area and bonding strength to posts.[33,35]

In the present study, the effect of airborne-particle abrasion on the bond strength of zirconia posts to resin cements revealed no statistical significance compared to the control group ($p > .05$). A former study reported that airborne particle abrasion or grinding may result in the development of flaws inside the microstructure of the zirconia ceramic material.[21,36] Bitter et al[21] reported increased higher bond strength values for zirconium posts after

Table 3. Mean push-out bond strengths and standard deviation (SD) of the experimental groups

Surface Treatment Groups	Mean (MPa)		SD	
	Zirconia	Quartz Fiber	Zirconia	Quartz Fiber
AIRB	10.12 ^{C}	20.08 ^{B}	1.23	1.40
SIL	17.02 ^{B}	14.28 ^{C}	1.61	1.66
TSC	21.24 ^{A}	24.62 ^{A}	1.91	1.71
CONT	10.68 ^{C}	13.96 ^{C}	1.23	1.14

Same letters show no significant difference ($p>0.05$)

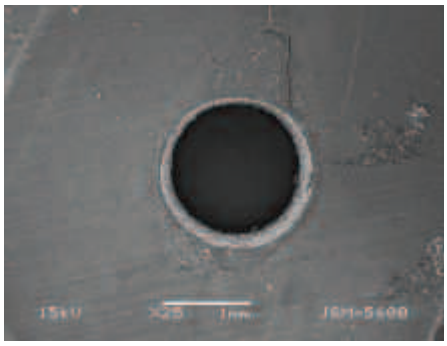


Figure 4. Representative SEM micrograph of AIRB zirconia group, demonstrating adhesive failure at the dentin-resin interface (x 25).

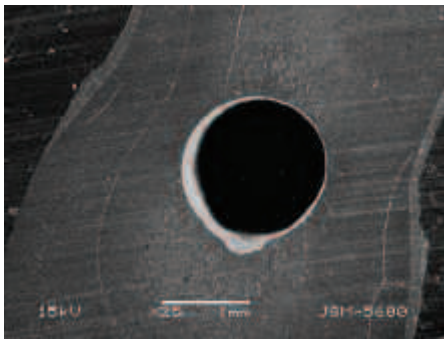


Figure 5. Representative SEM micrograph of SIL quartz fibre group, demonstrating adhesive failure at the post-resin interface (x 25).

airborne particle abrasion. However airborne particle abrasion was performed with alumina particles of 110 μm in their study whereas, in other studies[15,20] including the present study particles of 50 μm were used. This different finding may be explained by the fact that the large particle size may result in more micromechanical retention.[21] The representative SEM micrographs of this test group, demonstrating mostly adhesive failure at the dentin-resin interface, supported the findings of the study (Figure 4).

The effect of airborne particle abrasion application has been rarely described for fibre posts. Sahafi et al.[20] reported that alumina sandblasting increased the bond strength to glass fibre posts. Similar results were obtained in the study by Cheleux et al.[33] The results of the present study are comparable with the above studies in which airborne particle abrasion significantly increased the bond strength values in quartz fibre-reinforced post groups. This result can be explained by the role of sandblasting abrasion, mainly affecting the resin matrix rather than the post fibres, thereby increasing the post surface area.

Silane solutions are hybrid organic-inorganic compounds that can establish adhesion between organic and inorganic matrices by means of an intrinsic dual reactivity.[37] A chemical coupling at the post-resin cement interface is only possible between the resin cement and exposed fibres or filler particles of the post. It has been reported that no bonding is expected to occur between the methacrylate based resin of the cements and the epoxy resin matrix of quartz fibre reinforced posts due to the differences in chemistry.[38] The effect of silane application on the bond strength between fibre posts and resin cements revealed no statistical significance in the present study. Perdigao et al.[35] only applied silane with no prior surface preparation producing non significant results as were obtained as in the present study. The representative SEM micrographs of this test group demonstrated mostly adhesive failure at the post-resin interface (Figure 5). It was conjectured that the silica fibre surfaces need to be freshly exposed, preferably by physical abrasion in order to benefit from the silane coupling effects. The creation of strong siloxane bonds effectively increased the adhesion values. Recently published studies revealed promising results in conditioning prefabricated epoxy resin-based fibre reinforced posts with different solutions such as potassium permanganate and hydrogen peroxide followed by silanization.[39]

Zirconium-oxide posts are not silica based; therefore, chemical silica-silane bonds cannot be established as the chemical bonding to ceramic surface is based on the reaction between the silica content of the ceramic material and the silane coupling agent.[40] Moreover, the application of acidic agents such as phosphoric or hydrofluoric acid to zirconium posts will not create a sufficiently roughened surface for enhanced micromechanical retention.[41] Kern and Wegner[24] evaluated different adhesion methods and their durability after long-term storage of 150 days and repeated thermocycling. According to their study, silane application resulted in an initial bond that failed spontaneously after simulated aging. There was a significant difference in the mean bond strength values of zirconia post group which received silane coupling agent compared with the control group ($p < .001$) whereas no significant differences were recorded for the quartz fibre-reinforced post groups ($p > .05$) for the present study. This could be explained by better wettability of the silane coupling agent on the zirconia post surface. Comparable results may be achieved if durability of the bond strengths were also evaluated.

Silica coating techniques are proposed to increase the surface silica content and to establish chemical silica-silane bonding.[42] The surface of quartz fibre reinforced post with a cross-linked polymer matrix is reported to be well polymerized and only a small reactivity is left for free-radical polymerization bonding. The fact that the polymer phase cannot be dissolved by adhesive resin also avoids the possible inter-diffusion bonding mechanism. In agreement with previously reported studies of the adhesion between post and cement,[18,20] this study revealed improved post-cement adhesion after tribochemical silica-coating for two of the post systems tested. This system also serves as a micromechanical interlocking for post retention.[43] The failure analysis revealed mostly cohesive failure within cement followed by mixed failure type for the TSC group instead of adhesive failures (Figure 6 and 7).

It has been also reported that the type of cement used significantly influences the retention values of the post systems of different composition. Asmussen et al.[44] related this finding by differences in the corre-

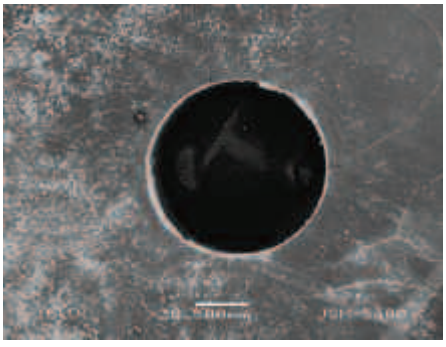


Figure 6. Representative SEM micrograph of TSC quartz fibre group, demonstrating cohesive failure within resin cement (x 30).

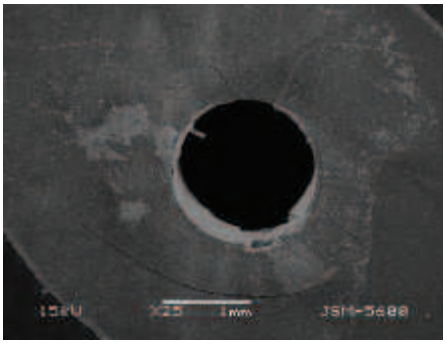


Figure 7. Representative SEM micrograph of TSC zirconia group, demonstrating mixed failure at the dentin-resin interface (x 25).

spondence of surface energy characteristics of the posts and cements. Previous studies reported increased bond strengths of resin cements containing functional phosphate monomers.[12,21,27,45] MDP monomer is able to form durable chemical bonds with ZrO2,[46,47] whereas the silane coupling agent acts to increase the wettability of post material.[33,40] Sahafi et al.[20] reported that MDP containing resin exhibited a comparable effect on bond strength values for airborne-particle abrasion and the Cojet treatment.

Within the limitations of this in vitro study it can be proposed that different surface treatments and physical characteristics of the post systems have an effect on the bond strength of quartz fibre-reinforced and zirconium posts cemented with adhesive resin cements. Nevertheless, further in vitro studies focusing on various combinations of surface treatments and different types of adhesive bonding systems and cements should be conducted for providing long term clinically effective results. The results of this study could also serve as effective measures for clinical applications.

Conclusion

Within the limitation of this in-vitro study, the following conclusions may be drawn:

1. The highest bond strength values were obtained with tribochemical silica coating (group TSC) for both of the post systems tested.
2. Airborne particle abrasion (group AIRB) resulted in having the second highest bond strength value in quartz fibre-reinforced post groups.
3. No significant differences were recorded for the quartz fibre-reinforced post group which received a silane coupling agent (group SIL) when compared with the control group.
4. Significantly higher initial bond strength values for the control groups were obtained for quartz fibre-reinforced posts compared to zirconium posts according to the within group analysis.
5. It could be speculated from these various control groups that adhesively cemented quartz fibre-reinforced posts with no surface treatment appear to be more retentive.

Disclosure

The authors declare no competing financial interests.

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Dentiste et leader :

Générez le succès

Par Jacques Marois, MSc

Sous le thème « Être dentiste et leader », cet article est le deuxième d'une série de trois ayant pour objectif d'amener les dentistes à prendre conscience de l'importance de devenir de meilleurs leaders, des leaders plus complets, aussi bien dans leur clinique dentaire que dans leur vie.

Le premier article en bref

Comme la plupart des experts, beaucoup de dentistes agissent comme si leur succès ne dépendait que de la qualité de leur expertise. Cette croyance est fausse! C'est, en effet, très important d'être un bon dentiste pour réussir, mais c'est encore plus important d'être un bon leader.

Un leader, c'est quelqu'un qui prend la tête d'un groupe de personnes et qui les influence à penser et à agir dans la direction qu'il leur propose. Dans votre centre dentaire, vous êtes un bon leader si vous réussissez à rallier votre équipe pour qu'elle travaille efficacement à son plein potentiel à l'accomplissement de votre vision. Vous êtes également un bon leader auprès de vos patients si vous réussissez à les influencer afin qu'ils optent pour les meilleurs choix de traitement pour eux-mêmes.

Le modèle de leadership que j'ai développé dans mon livre[1] et que j'ai introduit dans le premier article comprend quatre dimensions, auxquelles correspondent quatre archétypes des individus matures. Un archétype, c'est une force qui anime universellement les individus. Voici ce modèle :

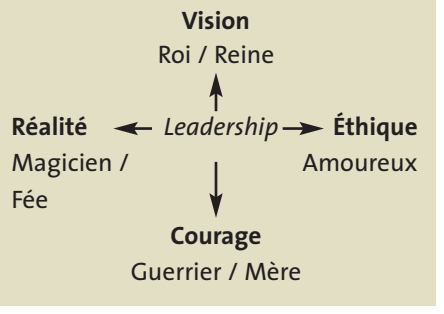

Schéma 1. Modèle intégré de leadership

Première dimension/archétype : Vision (Roi/Reinè)

Le premier article a porté principalement sur la première dimension du leadership : le *pouvoir de la vision* qui correspond à l'archétype Roi/Reine. Un bon leader propose une direction, montre le chemin aux autres et les mobilise à agir pour réaliser sa vision. C'est le volet idéaliste du leadership.

Le visionnaire propose aux autres de s'engager à créer un monde meilleur.

En tant que leader visionnaire, votre leadership repose en premier sur votre capacité :

- de communiquer aux membres de votre équipe : votre vision, votre mission, vos valeurs, vos standards (vos protocoles) et vos objectifs
- de mobiliser votre équipe afin que tous travaillent efficacement ensemble dans la direction que vous leur proposez

Avoir du leadership, ça commence par répondre à la question : qu'est-ce que je veux vraiment?

Ce deuxième article aborde la deuxième dimension du leadership qui porte sur le pouvoir de la connaissance, qui correspond à l'archétype Magicien/Fée.

Deuxième dimension/archétype : Connaissance (Magicien/Fée)

Cette deuxième dimension du leadership fait un contrepoids à la première dimension. C'est le volet pragmatique du leadership. C'est bien beau d'avoir un idéal, une vision, encore faut-il avoir les deux pieds sur terre. Un bon leader doit ainsi bien *connaître* la réalité.

Le mot clé pour cette dimension du leadership, ce sont *les faits*. Le leader réaliste garde

À propos de l'auteur

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le contact avec ce qui existe présentement. Pour un dentiste, être réaliste, c'est bien connaître son marché, ses employés, la dentisterie, ses forces et ses faiblesses. Tre réaliste, c'est se dire clairement la vérité. Tre réaliste c'est également être en contact avec les autres, avec leur réalité.

Les perceptions ne sont pas des faits, mais c'est un fait que les personnes ont des perceptions et que ces perceptions influencent les gens. Il est donc important pour lui de savoir comment les autres le perçoivent. Il cherche aussi à savoir comment ces perceptions influencent leurs attitudes et leurs comportements avec lui et au sein de l'équipe. Cette connaissance lui permet d'agir sur les facteurs qui influencent leurs perceptions, dans le but de générer de l'engagement, de l'efficacité et de l'enthousiasme.

Ainsi, pour être compétent dans cette deuxième dimension du leadership, le dentiste doit maîtriser deux formes de connaissances :

- La connaissance formelle de la réalité, des choses concrètes; par exemple, (1) bien maîtriser les connaissances reliées à son champ d'expertise (2) avoir de bons moniteurs pour suivre l'évolution de ses résultats
- La connaissance des êtres humains (des membres de son équipe, de ses patients et de lui-même), car c'est, avant tout, sur des êtres humains que repose la réalisation de son rêve

Cette deuxième dimension du leadership correspond presque parfaitement aux archétypes du Magicien et de la Fée.

Le Magicien a le pouvoir de la connaissance formelle

Le fait d'introduire des personnages comme les magiciens et les fées peut vous sembler quelque peu ésotérique. Détrompez-vous, ce ne l'est pas! Le Magicien, c'est le meilleur conseiller du Roi! Croyez-vous vraiment que les magiciens et les fées ont des pouvoirs magiques? Les non-initiés pensent que oui, les magiciens et les fées savent très bien que ce n'est pas le cas. Leur pouvoir est celui de la connaissance.

Le Magicien a le pouvoir de la connaissance rationnelle, de la connaissance formelle. Il comprend bien le monde matériel qui l'entoure. C'est de cette connaissance qu'il tire son pouvoir. Il mélange savamment les ingrédients pour en tirer une poudre aux pouvoirs qui semblent magiques pour tous, sauf pour lui qui sait exactement ce qui se cache derrière cette apparente magie.

Récemment, pendant que mon dentiste reconstruisait l'une de mes dents, j'essayais de m'imaginer ce qu'aurait pensé un patient qui aurait reçu de tels traitements au Moyen-Âge. J'ai ouvert la bouche et, sans souffrance, je repartais, quatre-vingt-dix minutes plus tard, avec une belle dent neuve! Ce patient aurait certainement pris mon dentiste pour un magicien. Le dentiste aurait probablement été éventuellement brûlé sur un bûcher. Pourtant, ce n'était pas de la magie. Pour le dentiste, ce n'était que l'application minutieuse de connaissances et d'habiletés qu'il avait acquises, comme tous les magiciens, dans une tour du savoir, auprès de magiciens plus savants que lui!

Vous êtes un dentiste, vous êtes donc un magicien des dents! Vous accomplissez des prodiges qui, pour les non-initiés, relèvent du miracle. Le Magicien apprend sans cesse, car sa quête est celle de la connaissance, de la maîtrise de la réalité. Il a toujours soif de découvrir, d'apprendre. Les dentistes sont généralement compétents dans l'archétype du Magicien, en ce qui a trait au volet dentisterie. Pour ce qui est d'un autre volet de la réalité des dentistes, celui de la gestion d'une micro-entreprise, ils le sont souvent beaucoup moins.

La Fée utilise le pouvoir de l'intuition

D'un seul coup de baguette magique, d'un seul mot, d'un seul regard, la méchante Fée peut vous transformer en crapaud et la bonne Fée peut vous donner des pouvoirs extraordinaires. Comme le Magicien, la Fée sait très bien qu'elle ne fait pas de magie. Son pouvoir est cependant plus proche de la magie, car elle le puise dans le domaine de l'intuition et de la connaissance profonde des êtres humains. La Fée connaît ce qui se cache dans le cœur des gens et elle sait comment y accéder pour le libérer. C'est l'archétype central au plan de la gestion des ressources humaines.

S'ils sont d'excellents magiciens des dents, les dentistes sont souvent, pour le moins, inconfortables avec l'archétype de la Fée. Plusieurs dentistes sont peu habiles avec leur baguette magique. J'en connais même qui, sans le vouloir vraiment, réussissent d'un seul regard ou en quelques mots, à transformer leurs employées en crapauds! Ils possèdent le pouvoir de la Fée, ils ont une baguette magique, mais ils la maîtrisent mal!

En fait, les dentistes ne sont pas les seuls à mal maîtriser cette importante dimension du leadership. C'est le cas de la majorité des professionnels et des cadres dans les organisations de toutes tailles. C'est en effet beaucoup plus facile de gérer des choses que de gérer des gens. De plus, dans un monde axé sur la connaissance rationnelle, l'intuition et la connaissance profonde de l'être humain sont très peu valorisées.

Pourtant, le leadership, c'est l'art d'influencer les autres. Comment pouvez-vous influencer efficacement les membres de votre équipe et influencer vos patients, si vous ne comprenez pas bien les forces qui les animent et si vous ne savez pas comment les canaliser?

Même si le domaine des dynamiques humaines n'est surtout pas une science exacte, en dépit des prétentions de certains experts, vous pouvez faire des progrès rapides et significatifs, peu importe vos habiletés présentes. Vos devez cependant décider d'en faire une priorité et d'y consacrer un peu de temps et d'efforts. En coaching et dans le cadre de mes formations avec les dentistes et les gestionnaires d'équipes dentaires, je propose à mes clients plusieurs stratégies personnelles et interpersonnelles qui permettent souvent de générer des résultats plutôt remarquables.

En voici trois qui illustrent bien comment vous pouvez avoir un fort impact positif sur votre équipe, simplement en appliquant des stratégies accessibles à tous. Voici donc ces trois « secrets » que connaissent bien les Fées. Ils vous seront utiles aussi bien avec votre équipe et vos patients, que dans votre vie.

Premier secret : faites attention au CIA!

Connaissez-vous les facteurs qui motivent le plus vos employées au travail? Est-ce l'argent? Les conditions de travail? Le fait d'avoir du travail intéressant? La possibilité de progresser dans leur carrière? La fidélité de leur leader?

Ce n'est aucune de ces réponses. De nombreuses études, dont celle présentée dans l'excellent livre de Thomas G. Crane, *The Heart of Coaching*,[2] démontrent que les trois facteurs qui influencent le plus la motivation des employés au travail sont, :

1. Se sentir **C**ompris
2. Se sentir **I**mportant et
3. Se sentir **A**pprécié

Si chacune de vos employées a la perception

que vous la comprenez, qu'elle a de plus la certitude d'être importante et si, en plus, elle est certaine que vous l'appréciez vraiment, chacune sera alors beaucoup plus motivée à vous donner son plein potentiel. C'est ce que j'appelle « Avoir le CIA de votre bord! ».

Dans le cas contraire, si vos employées ne se sentent pas comprises et/ou importantes et/ou appréciées, vous aurez alors le CIA contre vous et ça risque de vous coûter cher! En fait, même de généreuses augmentations de salaire n'auront alors qu'un effet positif de très courte durée (moins d'un mois). Mais comment faire pour avoir le CIA de votre coté?

Il y a plusieurs façons de le faire, mais, parmi toutes, il y a une arme redoutable. Connaissez-vous cette « arme ultime » face au CIA? Cette arme d'une efficacité redoutable, c'est *l'écoute*! L'art d'écouter, c'est le secret No 1 des Fées. C'est en *écoutant avec empathie*, avec le désir sincère de les comprendre vraiment, qu'elles accèdent aux forces qui les animent. Même les méchantes Fées sont, à leur façon, compétentes pour écouter. C'est en écoutant les autres qu'elles découvrent précisément quoi dire pour les transformer en crapaud! Dans le troisième article, je reviendrai plus à fond sur l'écoute lorsque j'aborderai l'archétype de l'Amoureux.

Deuxième secret : maîtrisez l'art d'apprécier!

Voici quelques chiffres provenant d'une très vaste étude menée auprès de 200 000 dirigeants et employés et présentée dans le livre « T*he Carrot Principle* » de Gostick et Elton.[3]

- 65% des employés affirment qu'on ne leur a témoigné aucune marque d'appréciation au cours de la dernière année
- 79% des gens quittent leur emploi principalement parce qu'ils ne ressentent pas qu'on apprécie leurs efforts
- 94% des employés les plus heureux au travail sont d'avis que leur patron reconnaît efficacement leur contribution, alors que c'est le cas pour seulement 2% des employés qui se disent malheureux au travail
- 66% des employés affirment que les témoignages d'appréciation les incitent de façon très significative à améliorer leur rendement

Cette étude ne fait que confirmer ce que plusieurs autres études ont déjà démontré : pour mobiliser votre équipe, apprenez à démontrer systématiquement votre appréciation à chacun des membres qui la composent!

D'ailleurs, après avoir, pendant des années, enseigné aux leaders d'équipe à travailler auprès de leurs employés afin d'éliminer leurs faiblesses, les meilleurs consultants leur enseignent maintenant à cultiver les forces de leurs employés. C'est beaucoup plus efficace ainsi.

En réalité, le problème, ce n'est pas tellement que les dentistes n'apprécient pas les membres de leur équipe, mais c'est plutôt qu'ils ne savent pas comment le leur démontrer ou pire, qu'ils ne voient pas l'importance de le faire. Régulièrement des dentistes me font part de leur inconfort et de leur incompréhension face au besoin constant d'appréciation démontré par certains membres de leur équipe :

« Je la paie bien pour qu'elle travaille bien. Je n'ai pas de temps à perdre à lui faire sans cesse des compliments. Je ne trouve pas ça adulte! »

« Elle devrait pourtant bien le savoir que je l'apprécie, si je n'étais pas satisfait, je le lui dirais (ou elle ne travaillerait pas dans ma clinique.)»

« Si je leur démontre trop que je les apprécie, ça va me coûter cher d'augmentation salariale.»

« Je suis un dentiste, pas un thérapeute! »

Voilà autant de citations qui démontrent que certains dentistes ne comprennent pas bien la réalité suivante : démontrer de l'appréciation, c'est au moins aussi payant pour le dentiste que pour l'employé! En fait, c'est possiblement un acte plus payant à l'heure, que tous les autres actes que vous poserez à votre chaise auprès de vos patients tout au long de la journée.

Voici une technique très efficace qui peut être utilisée avec toutes les personnes que vous appréciez (employés, clients, amis, conjoint, enfants). Pour en saisir tout l'impact, placez-vous dans la peau de la personne qui reçoit le témoignage d'appréciation. Il est probable que vous n'ayez pas reçu souvent, tout au long de votre vie, des marques aussi puissantes d'appréciation. Voici les 4 étapes à suivre.

Étape No 1 : Assurez-vous d'avoir l'attention de l'autre

Si vous êtes certain que l'autre personne est disponible pour vous écouter, vous pouvez aller directement à la deuxième étape. Sinon, assurez-vous de capter son attention en éveillant sa curiosité. Pour y arriver, je vous propose le choix de lui faire une très brève déclaration d'introduction ou de lui poser une question d'introduction.

Voici un exemple de déclaration d'introduction: « Nicole, je veux te dire quelque chose d'important au sujet de ce qui vient de se passer avec ta patiente. »

Voici maintenant un exemple de question d'introduction: « Nicole, j'ai quelques chose d'important à te dire maintenant, est-ce que je peux te parler deux minutes?»

L'idée, c'est de capter l'attention de votre employée, en éveillant sa curiosité. Après cette introduction, quand la curiosité est piquée, nos sens se focalisent pour la satisfaire.

Ne jouez pas de rôle, en prenant par exemple le ton de celui qui a un reproche à formuler. Votre intention est de démontrer votre appréciation, alors allez-y en vous laissant déjà habiter par un sentiment d'appréciation, voire de gratitude envers elle. Si votre employée est quelque peu inquiète relativement à ce que vous allez lui dire, vous savez déjà que vous allez la rassurer dans quelques secondes.

Étape No 2 : Lancer deux petites flèches bien pointues

Commencer par émettre deux ou trois petites observations positives très précises. Ces petites flèches d'appréciation visent à souligner les points précis que vous appréciez. Votre employée sera par la suite portée à les répéter. Ces petits compliments très pointus visent également à créer une brèche, une connexion émotionnelle positive pour la troisième étape. Plus vous serez précis et sincère lors de cette deuxième étape, mieux ce sera. Par exemple :

« Nicole, j'ai trois choses à te dire. La première, c'est que j'ai trouvé ça vraiment super quand tu as pris la main de madame X et que tu lui as dit… Ça l'a vraiment rassurée.»

Après avoir décoché votre première petite flèche d'appréciation, attendez quelques instants, puis décochez votre deuxième flèche :

« Je veux aussi te dire que j'apprécie vraiment les efforts que tu fais pour arriver à l'heure à la clinique, même si ce n'est pas facile pour toi avec ta situation familiale. »

Étape No 3 : Visez droit au cœur

L'ouverture est créée, il est maintenant temps de lancer droit au cœur votre mes-

sage global d'appréciation. Ce message ne porte pas sur les comportements, ils portent sur la personne elle-même. Ainsi, après avoir reconnu des comportements positifs, c'est le moment idéal pour reconnaître l'être humain à la source de ces comportements.

Votre message doit être complètement authentique et bref. Vous devez le dire avec votre cœur et non avec votre tête. N'exagérez rien, dites seulement ce que vous pensez en focalisant sur les qualités humaines à la base des comportements positifs que vous avez observés (vos deux petites flèches). Par exemple :

« Nicole, tu es une assistante très compétente, fiable et généreuse. Je me compte très chanceux de t'avoir dans mon équipe. »

Il est souhaitable que votre marque d'appréciation se termine par une brève déclaration démontrant l'impact que son comportement a sur vous : « … Je me compte très chanceux de t'avoir dans mon équipe ».

Vous avez maintenant lancé toutes vos flèches. Passez à la dernière étape.

Étape No 4 : Recevez avec ouverture

C'est maintenant à votre tour de recevoir. Vous avez lancé votre dernière flèche droit au cœur et marqué profondément votre employée. Ne parlez plus. Laissez les flèches agir, elles portent une substance magique très puissante : votre appréciation. Votre employée a été touchée et ses réactions peuvent être très variées. Il est possible qu'elle pleure, qu'elle soit gênée, heureuse. Il est possible qu'elle garde le silence, qu'elle vous retourne l'ascenseur ou simplement qu'elle vous dise merci! Dans tous les cas, vous n'avez rien à réparer, rien à changer. Recevez simplement son message, puis reprenez le cours de vos activités. Inutile de prolonger la situation. La substance magique poursuivra son travail dans le coeur de votre employée, et en vous.

La fréquence des messages d'appréciation peut varier selon les employés, mais dans tous les cas, ils doivent être assez fréquents pour que vos employés ne doutent jamais que vous les appréciez.

Troisième secret : appréciez aussi vos patients!

Quel dentiste ne voudrait pas avoir une pratique pleine, ne comprenant que des patients idéaux? Alors, quand vous avez un patient idéal sur votre chaise, ne vous gênez pas pour le lui dire.

Vos patients ont, eux aussi, le besoin de se sentir Compris, Importants et Appréciés. Si vous réussissez avec eux également à mettre le CIA de votre bord, ils vous seront fidèles et ils auront davantage de chance de vous référer des patients idéaux comme eux.

Influencer ou manipuler

La principale force des leaders, c'est leur capacité d'influencer les autres. Comme le démontrent ces exemples, l'art d'influencer peut prendre des formes très subtiles.

Dans le contexte du leadership, il y a une importante distinction à faire entre « influencer » et « manipuler » :

Un leader manipule les autres quand il utilise les autres afin de satisfaire ses propres intérêts. Il les influence quand il vise à servir ce qu'il perçoit être le meilleur intérêt de son patient.

La distinction semble claire en théorie :

Quand on manipule on se sert des autres

Vs

Quand on influence on vise à les servir!

Dans la réalité quotidienne de votre clinique dentaire, cette distinction s'avère parfois beaucoup moins claire. Elle peut même devenir très difficile à établir quand votre intérêt et celui de vos patients ou de vos employés convergent.

Par exemple, vous voulez présenter à votre patient un plan de traitement complexe et dispendieux. C'est ce plan qui, à vos yeux d'expert, est le plus approprié pour votre patient. C'est également celui qui est le plus intéressant et le plus payant pour vous. Vous voulez l'influencer, mais c'est vraiment contre vos valeurs de le manipuler. Au moment où vous présenterez ce plan à votre patient, quel genre de leader serez-vous?

Serez-vous celui qui influence et qui gardera le cap en vue d'amener son patient à faire le meilleur choix en fonction de sa santé et de ses autres priorités personnelles?

Serez-vous celui qui manipule et qui cherchera avant tout à servir ses propres intérêts, au détriment des autres priorités du patient?

Serez-vous celui qui abdique et qui renoncera à son pouvoir d'influence, par crainte de manipuler ou de déplaire à son patient?

Comme vous le voyez, c'est quand votre intérêt et l'intérêt du client convergent, que la ligne de démarcation peut vous sembler grise dans votre tête! Influencer, c'est demeurer intègre face à soi et face à l'autre.

Suis-je en train de manipuler mon patient pour servir mes propres intérêts ou de l'influencer dans son meilleur intérêt?

La ligne de démarcation c'est votre intention. Quand vous proposez une solution à votre patient : Est-ce que vous pensez en premier à son intérêt? De plus, avez-vous toute l'information requise pour bien cerner quel est son meilleur intérêt, compte tenu de ses autres priorités?

Si la réponse est : OUI! Alors, allez-y, et agissez en bon leader : influencez-le! C'est l'éthique de chercher à influencer votre client, en restant dans le cadre des limites acceptables : ne pas mentir, ne pas faire des promesses irréalistes, ne pas cacher une partie de la réalité qui pourrait le faire reculer, ne pas faire de chantage émotionnel (de la pression).

Quand vous renoncez à votre pouvoir d'influencer votre patient par crainte de lui déplaire et éventuellement par crainte de le perdre comme patient, j'estime que vous commencez à pencher du côté de la manipulation. En effet, ne pas dire « votre vérité d'expert » à votre patient, par crainte de le perdre et qu'il change de dentiste, ça se rapproche de la manipulation.

Par ailleurs, il arrive souvent que ce ne soit ni urgent, ni le bon moment pour expliquer votre plan de traitement à votre patient. Alors, s'il n'est pas vraiment disponible pour vous écouter, limitez-vous à l'essentiel et attendez le bon moment.

N'oubliez jamais que votre réalité de dentiste n'est qu'un aspect de la réalité pour le patient. Votre patient n'est pas que des dents. Il a sa vie, ses priorités, ses obligations. C'est à partir de toutes les données qui définissent son contexte qu'il fera ses choix. Plus vous découvrirez quelles sont ses autres priorités, plus vous serez en mesure d'établir, avec lui, une stratégie de traitement qui concorde avec sa vie. Encore une fois ici, la clé c'est l'écoute. Un leader compétent dans l'archétype Magicien/Fée sait poser les bonnes questions et il sait aussi écouter ce que le patient cherche à lui faire comprendre. Il sait que, pour influencer son patient, il doit bien le comprendre.

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Dentist and Leader:

Generate Success

By Jacques Marois, MSc

This article is the second in a series of three articles on the theme of "Dentist and Leader," with the goal of encouraging dentists to reflect upon the importance of becoming better, more well-rounded leaders in their dental clinics and in their lives.

Summary of the First Article

Like most experts, many dentists act as though their success depends solely on the quality of their expertise. This belief is misleading! Being a good dentist is indeed a necessary foundation for success, but it is even more important to be a good leader.

A person who has a goal and who heads up a group of people, *influencing* them to think and act to achieve that goal, is a leader. In your dental practice, you are a good leader if you are able to rally your team members to work effectively to their full potential in order to accomplish your vision. You are also a good leader to your patients if you are able to influence them to make the best decisions about treatment for themselves.

The leadership model I developed in my book,[1] and which I introduced in the first article, is made up of four dimensions, corresponding to the four archetypes of mature individuals. Archetypes are strengths which universally empower individuals. This is what the model looks like:

Diagram 1. Integrated leadership model.

First Dimension/Archetype: Vision (King/Queen)

The first article mainly covered the first dimension of leadership: *the power of vision*, corresponding to the King/Queen archetype. Good leaders set a goal, show others the way and mobilize them to act to achieve their vision. This is the idealist aspect of leadership. A visionary calls on others to get involved in creating a better world.

As a visionary leader, your leadership is based first and foremost on your ability to do the following:

- communicate to the members of your team: your vision, mission, values, standards (protocols) and objectives, and
- mobilize your team so that they all work effectively together towards the goal you have set them.

Exercising leadership starts with answering the question: *What do I really want?*

This second article deals with the second dimension of leadership, the *power of knowledge*, corresponding to the Magician/Fairy archetype.

Second Dimension/Archetype: Knowledge (Magician/Fairy)

This second dimension of leadership counterbalances the first dimension. This is the pragmatic aspect of leadership. While it is great to have an ideal or vision, you also have to keep both feet on the ground. Thus, a good leader must also really *know* the reality.

The facts are a key concept for this dimension of leadership. A realistic leader stays in touch with the status quo. For a dentist, being realistic means really knowing your market, your employees, dentistry, and your strengths and weaknesses. Being realistic means telling yourself the truth plainly. Being realistic also involves being in contact with others and with their realities.

About the author

Jacques Marois, strategist, coach, and experienced and enthusiastic trainer, has a master's degree in economy and extensive training in coaching. In 1999, he cofounded Inter Formation, a company offering coaching and training to SME leaders and their teams. In 2006, he decided to focus his expertise on dentists and dental teams. To order his book, Dentiste et Leader, *or for more information on the services offered by Inter Formation, write to jacques.marois@interformation.ca or call 450-449-9700.*

Perceptions are not facts; however, it is a fact that people have perceptions and that those perceptions influence them. Therefore, it is important for dentists to know how others perceive them. Dentists must also seek to know how those perceptions influence people's attitudes and behaviours towards the dentist and within the team. With that knowledge, dentists are able to take action on the factors that influence other people's perceptions, in order to generate commitment, effectiveness, and enthusiasm.

Thus, to be competent in this second dimension of leadership, dentists must master the following forms of knowledge:

- Formal knowledge of reality or concrete things, for example, (1) mastering the knowledge related to their field of expertise, (2) having good dashboards to track the progress of results;
- Knowledge of human beings (members of your team, your patients, and yourself), because achieving your dream is based primarily on human beings.

This second dimension of leadership is an almost perfect match with the Magician and Fairy archetypes.

The Magician Has the Power of Formal Knowledge

Introducing characters such as magicians and fairies may seem slightly esoteric. But you are quite mistaken; that is not the case! The magician is the king's best advisor! Do you really believe that magicians and fairies have magical powers? The uninitiated think so, but magicians and fairies know very well that is not true. Their power comes from knowledge.

The magician has the power of rational or formal knowledge. He has a clear understanding of the material world around him. He draws his power from that knowledge. He skilfully mixes the ingredients to produce a potion with powers which everyone thinks are magical, except him, because he knows exactly what is hidden behind the apparent magic.

Recently, while my dentist was reconstructing one of my teeth, I tried to imagine what a patient would have thought about receiving similar treatment in the Middle Ages. I opened my mouth and, with no pain, I left again 90 minutes later with a beautiful new tooth! That patient would certainly have taken my dentist for a magician and the dentist would probably have eventually been burned at the stake. Yet, it was not magic. For the dentist, it was merely the meticulous application of knowledge and skills that he had acquired, like all magicians, in a tower of knowledge, from magicians more knowledgeable than him!

You are a dentist, so you are a tooth magician! You accomplish wonders which, for the uninitiated, are miraculous. A magician never stops learning, because his quest is the quest for knowledge, for mastery of reality. He is always driven to discover and learn. Dentists are generally competent in the magician archetype insofar as dentistry is involved. For another aspect of dentists' reality, managing a small business, they are often much less competent.

The Fairy Uses the Power of Intuition

With a single wave of her magic wand, with a single word, a single look, the bad fairy can change you into a frog or the good fairy can give you extraordinary powers. Like the magician, the fairy knows full well that she is not performing magic. However, her power is more like magic because she gets her power from intuition and an in-depth knowledge of human beings. The fairy knows what is hidden in people's hearts and she knows how to access and release it. This is the central archetype for human resource management.

Although they are excellent tooth magicians, dentists are often, to say the least, uncomfortable with the fairy archetype. Many dentists are not very handy with their magic wands. I even know some who, without really meaning to, with a single look or a few words, manage to change their employees into frogs! They have the fairy's power, they have a magic wand, but they have not mastered it!

Dentists are not the only ones who have not mastered this important dimension of leadership. This is true of the majority of professionals and managers in organizations of all sizes. It is much easier to manage things than people. Besides, in a world focused on rational knowledge, intuition, and an in-depth knowledge of human beings are not very highly valued.

And yet, leadership is the art of influencing others. How can you effectively influence the members of your team and influence your patients, if you do not have a clear understanding of the strengths that empower them and if you do not know how to channel those strengths?

Although the field of human dynamics is really not an exact science, despite the claims of some experts, you can make rapid, significant progress, no matter what your current skill level is. However, you must resolve to make it a priority and devote time and effort to it. When I am coaching or training dentists and dental team managers, I offer my clients several personal and interpersonal strategies which often produce quite remarkable results.

The following are three strategies which clearly illustrate how you can have a major positive impact on your team, simply by applying strategies which are accessible to all. So, these are three "secrets" that the fairies know well. They will be helpful to you with your team and your patients, and in your life.

First Secret: Pay Attention to the UIA!

Do you know the factors that most motivate your employees at work? Is it money? Working conditions? Having an interesting job? Career advancement opportunities? The loyalty of their leader?

None of these are the answer. Many studies, including the one presented in the excellent book by Thomas G. Crane, "*The Heart of Coaching*"[2] show that the three factors that most influence employee motivation are:

1. Feeling **U**nderstood,
2. Feeling **I**mportant, and
3. Feeling **A**ppreciated.

If all your employees perceive that you understand them, if they are satisfied that they are important, and if, in addition, they are sure that you truly appreciate them, they will then be much more motivated to give you their full potential. This is what I call "Having the UIA on your side!"

Conversely, if your employees do not feel understood and/or important and/or appreciated, then you will have the UIA against you and that could well prove expensive! As a matter of fact, even generous salary increases will only have a very short-term positive effect (less than a month). But what can you do to keep the UIA on your side?

There are several ways to accomplish this but, of them all, there is one formidable weapon. Do you know the "ultimate weapon" for the UIA? This absolutely for-

midable weapon is … listening! The art of listening is the fairies number one secret. By *listening with empathy*, with a sincere desire to truly understand others, fairies can access the strengths that empower them. Even bad fairies are competent at listening, in their own way. By listening to others, they discover exactly what to say to change them into frogs! In the third article, I will go into more detail about listening when I introduce the archetype of the lover.

Second Secret: Master the Art of Appreciation!

The following figures are from a very extensive study conducted on 200,000 managers and employees, which is presented in the book *The Carrot Principle* by Gostick and Elton[3]:

- 65% of employees report that they have been shown no sign of appreciation during the previous year;
- 79% of people leave their jobs mainly because they do not feel that their efforts are appreciated;
- 94% of the employees who are happiest at work believe that their boss effectively recognizes their contribution, while only 2% of employees who say they are unhappy at work have the same belief;
- 66% of employees report that signs of appreciation provide very significant encouragement for them to improve their performance.

This study only confirms what several other studies have already shown: to mobilize your team, you must learn to *systematically show your appreciation* to each and every team member!

Moreover, having spent years teaching team leaders to work with their employees to eliminate their weaknesses, the best consultants are now teaching them to cultivate their employees' strengths. This is much more effective.

In actual fact, the problem is not so much that dentists do not appreciate the members of their team, but rather that they do not know how to show them their appreciation or, even worse, they do not see the importance of doing so. On a regular basis, dentists tell me about their discomfort with and inability to understand the constant need for appreciation shown by some members of their teams:

"I pay her well so that she works well. I don't have any time to waste paying her compliments all the time. I don't think that's very mature!"

"But she ought to know that I appreciate her; if I wasn't satisfied, I'd tell her (or she wouldn't be working in my clinic)."

"If I show them too much that I appreciate them, it'll cost me in salary increases."

"I'm a dentist, not a therapist!"

These are all quotes which show that some dentists do not really understand the following reality: showing appreciation is at least as profitable for the dentist as for the employee! In fact, on an hourly basis, it might well be an action which is more profitable than all the other actions you will take for patients in your chair in the course of a day.

The following is a very effective technique which can be used with everybody you appreciate (employees, clients, friends, partner, children). In order to really feel the impact, place yourself in the position of the person receiving the message of appreciation. Probably you have not often received, in your entire lifetime, such powerful signs of appreciation. There are four steps to follow.

Step No 1: Make Sure You Have the Other Person's Attention

If you are sure that the other person is available to listen to you, you may go directly to the second step. Otherwise, make sure you attract the person's attention by piquing his or her curiosity. To do so, I suggest you either make a very short introductory statement or ask an introductory question.

This is an example of an introductory statement: "Nicole, I want to say something important about what just happened with your patient."

And this is an example of an introductory question: "Nicole, I have something important I'd like to say now, may I speak to you for a couple of minutes?"

The idea is to attract your employee's attention by piquing his or her curiosity. After that introduction, when the curiosity is piqued, our senses are focused on satisfying that curiosity.

Do not play a role, for example, by sounding like somebody with a criticism to make. Your intention is to demonstrate your appreciation, so start off by already having a feeling of appreciation or gratitude towards the person. Even if your employee is slightly worried about what you are going to say, you already know that you are going to reassure him or her in a few seconds.

Step No 2: Launch Two Very Targeted Little Arrows

Start by offering two or three very specific, positive little observations. The purpose of these appreciative little arrows is to highlight the specific points that you appreciate. Your employee will then be likely to repeat them. These very targeted little compliments are also intended to create an opening, a positive emotional connection for the third step. The more specific and sincere you are in this second step, the better, for example:

"Nicole, I have three things to say. The first is that I thought it was really great when you held Mrs. X's hand and you told her … That really reassured her."

After releasing your first little arrow of appreciation, wait a few seconds, then release your second one:

"I also want to tell you that I really appreciate the effort you make to get to the clinic on time, even though it's not easy for you with your family situation."

Step No 3: Get Right To the Heart of Things

The opening has been created and now it is time to get right to the heart of your overall message of appreciation. This message is not about behaviour; it is about the person themselves. After recognizing positive behaviour, this is the ideal time to recognize the human being behind that behaviour.

Your message must be absolutely genuine and brief. You must say it with your heart, not your head. Do not exaggerate anything, just say what you think, focusing on the human qualities behind the positive behaviour you have observed (your two little arrows), for example:

"Nicole, you are a very competent, reliable and considerate assistant. I consider myself very lucky to have you on my team."

Ideally, your sign of appreciation will end in a short statement showing the impact of the person's behaviour on you: "… I consider myself very lucky to have you on my team."

Now you have sent all your arrows. Go on to the next step.

Step No 4: Receive Openly

Now it is your turn to receive. You sent your last arrow right to the heart and profoundly affected your employee. Do not say anything else. Let the arrows do their work; they contain a very powerful magical sub-

stance: your appreciation. Your employee has been touched and his or her reactions may be very varied. It is possible that there may be tears, or your employee might be embarrassed or pleased. Your employee may stay silent, may repay the compliment, or may simply say thank you! In any case, you do not have to fix or change anything. Simply receive your employee's message then go back to your activities. There is no need to prolong the situation. The magical substance will continue working in your employee's heart, and in you.

The frequency for messages of appreciation may vary by employee, but in all cases, messages must be frequent enough that your employees are never in any doubt that you appreciate them.

Third Secret: Also Appreciate Your Patients!

What dentist would not want to have a full practice with nothing but ideal patients? So, when you have an ideal patient in your chair, do not hesitate to say so.

Your patients also need to feel Understood, Important, and Appreciated. If you manage to get the UIA on your side with them as well, they will be loyal to you and they will be more likely to refer ideal patients like themselves to your practice.

Influencing or Manipulating

The greatest strength of leaders is their ability to influence others. As these examples show, the art of influencing may take very subtle forms.

In the context of leadership, there is an important distinction between influencing and manipulating.

Leaders *manipulate* others when they use them to satisfy their own interests. They *influence* others when they aim to serve what they perceive to be in the patient's best interests.

The distinction seems clear in theory:

When you manipulate, you are using others

Vs.

When you influence, you aim to serve others!

In the daily reality of your dental clinic, this distinction is sometimes much less clear. It may even become very difficult to establish when your interests and the interests of your patients or your employees converge.

For example, you want to present your patient with a complex, costly treatment plan. In your opinion as the expert, that plan is the most appropriate one for your patient. It is also the one that is most valuable and profitable for you. You want to influence your patient, but it is really against your values to manipulate the patient. When you present this plan to your patient, what kind of leader will you be?

Will you be a leader who influences, whose goal is to lead your patient to make the best decision based on your patient's health and other personal priorities?

Will you be a leader who manipulates, seeking first and foremost to serve your own interests, at the expense of the patient's other priorities?

Will you be a leader who abdicates, relinquishing your power to influence, for fear of manipulating or displeasing your patient?

As you can see, when your interests and the client's interests converge, the boundary line may appear grey in your mind! Influencing means remaining honest to yourself and to others.

Am I manipulating my patient to serve my own interests or influencing my patient in his or her best interests?

The boundary line represents your intention. When you suggest a solution to your patient, are you thinking first about your patient's interests? And do you have all the necessary information to really figure out what is in your patient's best interests, considering the patient's other priorities?

If the answer is: YES! Then go ahead, and act like a good leader; influence the patient! It is ethical to try to influence your client, while staying within acceptable limits. Do not tell lies, do not make unrealistic promises, do not hide any part of the reality which might make your patient pull back, do not exert emotional blackmail (pressure).

When you relinquish your power to influence your patient for fear of displeasing the patient and possibly for fear of losing the patient from your clinic, I believe that you are starting to lean towards manipulation. Not telling the patient "your truth as an expert," for fear of losing the patient to another dentist, is getting close to manipulation.

Furthermore, it often happens that it is neither urgent or the right time to explain your treatment plan to your patient. So, if the patient is really not available to hear you, limit yourself to the basic points and wait for the right time.

Always remember that your reality as a dentist is only one aspect of reality for your patients, who are more than just their teeth. Each patient has a life, priorities and obligations. Decisions are made based on all the information defining your patient's context. The more you find out about your patient's other priorities, the more you will be able to establish, with your patient, a treatment strategy that suits his or her life. Here again, listening is the key. Leaders who are competent in the magician/fairy archetype know how to ask the right questions and also know how to hear what patients are trying to make them understand. They know that, in order to influence their patients, they must really understand them.

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Using Provisional Restorations

to Guide Tissue Healing for Predictable Prosthetic Esthetics

By Bruce Kleeberger, DDS

ABSTRACT

Provisional restorations can be used to guide soft tissue healing following surgical intervention. Interdisciplinary treatment planning for predictable outcomes is critical and involves co-ordinating the various specialist services. Five cases are presented to demonstrate the use of bis-acryl ("composite") materials at various stages of the restorative process. Some of these involve fixed tooth supported restorations and others are supported by osseointegrated implants.

The development of multi-opacity, repairable and polishable bis-acryl materials has improved our ability to durable long term provisionals. They can be manipulated easily chairside to provide a matrix which supports the tissue or generates a force to direct gingival tissue healing. In addition, these provisional restorations are highly esthetic.

RÉSUMÉ

Les restaurations provisoires peuvent être utilisées pour guider la guérison des tissus mous après une intervention chirurgicale. La planification des traitements interdisciplinaires pour prévoir les résultats est essentielle et implique la coordination des services de plusieurs spécialistes. Cinq cas sont présentés pour montrer l'utilisation des matériaux bis-acrylique (" Le composite") à des stades variés du processus de restauration. Certains comprennent des restaurations de dents fixes et autres sont soutenues par des implants osseointegrés.

About the Author

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Le développement de matériaux bis-acryliques multi-opaques, réparables et polissables a amélioré la durabilité des provisoires de longue durée. Elles peuvent être manipulées facilement sur place pour fournir une matrice qui soutient le tissu ou produit une force pour diriger la guérison du tissu gingival. En plus, ces restaurations provisoires sont hautement esthétiques.

Dental patients have heightened awareness of the esthetic potential of their dental treatment. They demand beautiful and durable restorations. The restoring dentist is obligated to provide a high level of interdisciplinary care and must be able to coordinate the various specialties of dentistry to meet these requirements. It is imperative that each case be planned carefully; beginning with the end in mind and with the patients' expressed wants as a consideration during the planning phase but also through the entire course of treatment. The restoring dentist must be the "quarterback" for the entire game plan in order that the patient (the "owner of the team") receives the result he expects. The dentist must understand the diagnosis, and be able to create an environment in which the outcome is predictable. Soft tissue management is a key to the success of dental prosthetic outcomes.

Fortunately there continue to be advances in dental science, technology and the clinicians' understanding of the relevant biology. Grafting of bone and soft tissue are common regenerative procedures. The tissues must be carefully managed post-surgically throughout the surgical and restorative phases to meet the functional and esthetic requirements of the case. By providing a suitable provisional restoration during the healing period, soft tissue can be moulded and guided in a predictable manner.

The growth of periodontal tissue grafting technologies has been remarkable in the recent years. Autogenous, allograft, xenograft, and synthetic bone materials are frequently used to augment the tissue if the clinical situation requires it. Connective tissue grafts, including pedicle grafts, like those demonstrated by Dr. Stig Osterberg, Port Angeles, WA, allow the regeneration of an acceptable volume of soft tissue. Previously the absence of adequate soft tissue would have been camouflaged with pink porcelain. It is not only possible, but considered standard of care, that patients be offered these services as part of the comprehensive treatment planning in the esthetic zone. A sequence of considerations for interdisciplinary treatment planning the management of soft tissue during the surgical and restorative phases of fixed dental prosthetics, with and without implants is presented in Figure 1.

Although acrylic resins such as SNAP (Parkell Inc, Farmingdale, NY) have been used traditionally as provisional restorative materials, they are difficult to manipulate. The advent of bis-acryl resins in various consistencies, shades, opacities (translucencies), and filler particle sizes has made them an ideal material for short- and long-term provisionalization. They can self-cure by base/catalyst reactions in the absence of light, on demand with a curing light or a combination of self cure and light cure. An improved bis-acryl provisional restoration can be fabricated in the laboratory by enhancing light, pressure, and in a vacuum to increase the percentage of cured resin and decreasing porosity, thereby increasing strength. This makes it possible to repair, reline, make additions to, and tint the provisional restoration. The provisional can be customized to mimic natural teeth at least as well as porcelain, which is especially important in the anterior esthetic zone.

Pontic Site Tissue Guidance

When there is adequate gingival tissue volume overlying an edentulous ridge it is possible to create a soft tissue receptor site designed for the pontic to rest in and creat-

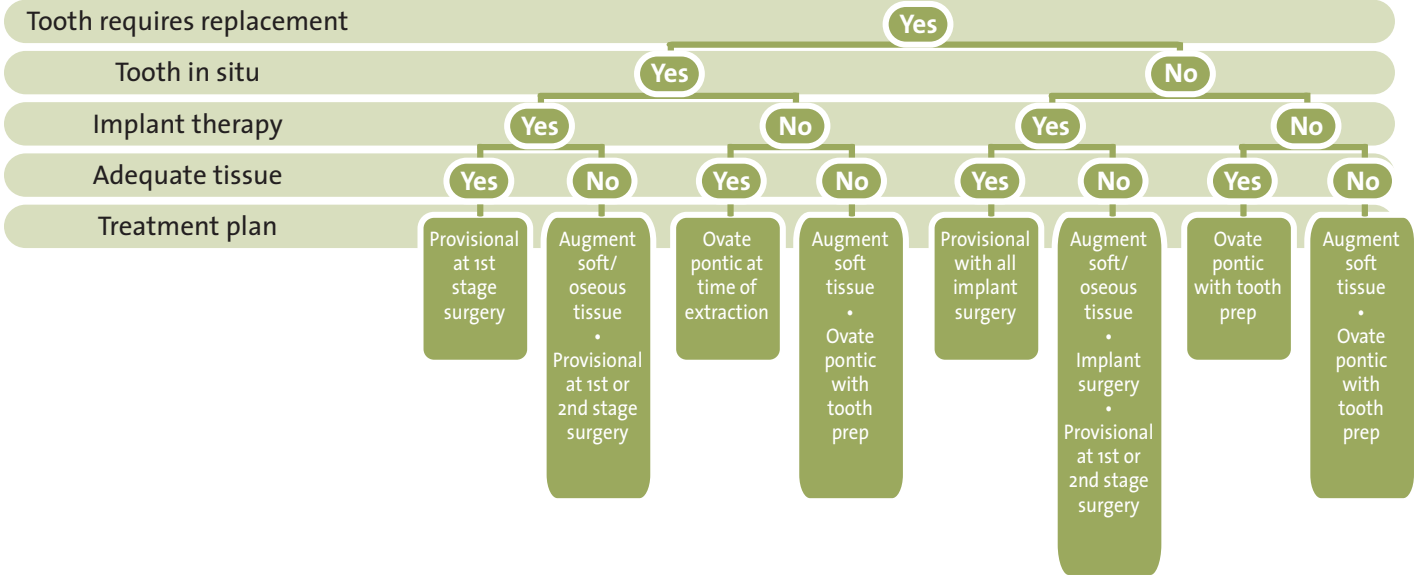

Figure 1. Interdisciplinary treatment planning for the management of soft tissue with provisionalization.

ing the illusion of a natural tooth erupting from intact periodontal tissues This pontic design is termed an "ovate pontic" and the prepared ridge is called an ovate pontic receptor site.

The site may be prepared at the time of tooth preparation by indenting the crest and labial of the residual ridge with a large, egg shaped diamond bur, sculpting with electrosurgery, or ablating with the diode laser. The provisional restoration is contoured in an "egg shaped" fashion and when it is placed onto the tissue it exerts slight pressure so that is blanches the tissue for no more than 5 minutes. The pontic should be smooth and polished.

The guidance of gingival tissue to create a pontic receptor site can also begin following tooth extraction if provisionalization can begin immediately. This requires the surgery to be co-ordinated with the prosthetic treatment. The provisional restoration is contoured in an ovate fashion and when it is cemented, it extends slightly into the fresh extraction site. The provisional restoration is checked for adequate contour and tissue support at 2-, 6-, and 12-week intervals.

In either case, when the patient returns for the final restoration, the site is healed and the final restoration should again exert slight pressure with blanching of the tissue, on the ridge. The blanching will disappear within 5 minutes if this is done correctly. This creates a very natural emergence profile for the restoration.

Case 1: Mature Ridge Recontouring

The patient presented with the upper right lateral incisor missing but replaced with a removable partial denture (Figure 2). As part of her phased treatment plan she wanted to begin with the replacement of the tooth but planned to proceed with restoration of the remaining maxillary anterior teeth as time and finances allowed. As she wanted whiter teeth, the definitive restoration would need to be a different shade than the unrestored teeth. She declined implant therapy to replace the tooth because she did not want the bone augmentation procedure that would have been necessary before predictable implant restoration. The ridge had healed with adequate soft tissue in the bucco-lingual and apico-occlusal dimensions. At the time of tooth preparation for the fixed restoration, the soft tissue was contoured with a large coarse diamond and a bis-acryl provisional was contoured to press into the soft tissue preparation and encourage favourable healing (Figure. 3). When the final restoration was tried in it blanched the tissue (Figure 4). After 5 minutes the blanching disappeared and the pontic had the illusion of a tooth emerging from periodontal tissue (Figure 5).

Case 2: Gingival Augmentation to Create a Soft Tissue Ridge

The patient presented with an implant in the upper right central incisor location. He wanted a comprehensive dental restoration. The implant was placed at the time of tooth extraction and had been placed too far apically and facially. As part of the comprehensive treatment plan, the remaining incisors were to be restored and would serve well as abutments for a bridge supporting the pontic in the right central incisor position.

When it was first examined, the implant had a healing abutment screwed to the implant in the upper right central incisor position and a pontic bonded to the adjacent teeth (Figure 6). Soft tissue augmentation to create coverage of the facial surface of the implant had been attempted but was unsuccessful. When the healing abutment was removed, however, there was adequate space and blood supply for a ridge augmentation using a pedicle graft from the palate. This was accomplished with success. The ridge could then be prepared at the time of provisionalization to create a pontic receptor site, as was done in case 1. The provisional was fabricated directly in the mouth and then allowed to guide the soft tissue maturation for several months (Figure 7). The timing of the soft tissue surgery and anterior provisionalization coincided with the posterior provisionalization. The posterior provisionalization was required in order to evaluate long-term occlusal stability in this bite opening case as is taught by Dawson.[1] In the definitive restoration the pontic gives the illusion of a tooth emerging from periodontal tissue (Figures 8 and 9).

Case 3: Planning the Intrusion of the Anterior Segment with Soft Tissue Management

The patient attended with mobility of the upper central incisors and inadequate periodontal support of all maxillary incisors. He had an angle class II skeletal pattern and dental class II, division 2 occlusion with

Figure 2. The right lateral incisor was extracted years earlier, and then replaced by a removable partial denture. There is inadequate bone for an implant without augmentation but adequate soft tissue remains for an esthetic restoration.

Figure 3. Two weeks after tooth preparation, tissue contouring and cementation of a bis-acryl provisional the tissue has healing favourable to an ovate pontic.

Figure 4. When the definitive restoration is tried in and fully seated the soft tissue will blanch for only 5 minutes.

Figure 5. To relieve the patient from wearing a removable prosthesis, the cantilever bridge was placed. The shade is the final shade for the comprehensive restoration planned to continue in the future and to include the remaining anterior teeth. Note the labial emergence profile of the restoration.

Figure 6. The implant had been placed too far apically and labially to be restorable. The resulting soft tissue defect is an esthetic challenge. An acrylic pontic has been bonded to the adjacent teeth to serve as a provisional restoration.

Figure 7. The healing abutment was removed and gingival augmentation surgery (pedicle graft) created adequate soft tissue volume. The provisional restoration helped guide the soft tissue during maturation following surgery. This working model demonstrates the resulting soft tissue contours achieved from adequate provisionalization.

typical[2] severe overbite and maxillary anterior crowding (Figures 10 and 11). The maxillary teeth have supra-erupted, along with their soft tissue support (Figure 12). He has excessive display of teeth and soft tissue upon smiling. Although there was to be posterior restorative treatment as part of the comprehensive treatment plan, there was no need to increase vertical dimension in order to create posterior restorative room (Figures 13 and 14).

The treatment plan required an increase in the anterior vertical dimension for restoration of function and aesthetics. This can be accomplished in one or a combination of ways[3,4] including the following:

- Orthodontic: intrusion/relative extrusion
- Periodontal: Repositioning of the gingival margin (surgical crown lengthening
- Restorative: increasing posterior restorative vertical dimension ("bite raising")
- Surgical: segmental osteotomy and intrusion of the anterior segment

Interdisciplinary treatment planning of the case resulted in the decision to intrude the maxillary anterior by use of a combination approach to treatment. The incisor teeth were extracted (as they were periodontally compromised) and the soft tissue healing directed by use of a long term bis-acryl laboratory processed provisional restoration. This created the illusion that the periodontal apparatus was moved apically.

The case was planned in the same way as a denture set-up is planned. The teeth were removed from the model and the ideal location of the central incisors determined, using the "neutral zone" as taught by Dawson[1] as a guide (Figure 15). A full contour waxup was completed for the case (Figure 16). Laboratory processed bis-acryl provisional restorations (Radica Dentsply, York, PA) were fabricated (Figures 17 and 18). When the teeth were extracted the soft tissue was reflected sufficiently to allow osseous recontouring as guided by the surgical stent fabricated from the waxup. The adjacent teeth were prepared as abutments for the anterior bridge The provisional restoration was relined with flowable bis-acryl material (Integrity, Dentsply, York, PA) (Figures 19 and 20) and cemented with temporary cement (Figure 21). Over the subsequent 4 months, the provisionals, which can easily be augmented and polished (Figures 22 and 23), were used to

Figure 8. Lateral view of the definitive restoration. Note absence of scaring in the area of the soft tissue augmentation around right central incisor pontic and the normal emergence profile.

Figure 9. Anterior retracted view of the definitive restoration at 3-years post treatment.

Figure 10. The patients chief concerns were his failing posterior teeth and his loose maxillary anterior teeth.

Figure 11 Retracted anterior view. Note the severe overbite and crowding of the maxillary anterior teeth which is typical of the class II, division 2 occlusal pattern.

Figure 12. The anterior teeth, lacking contact with lower incisors have supra-erupted. The soft tissue margins of the incisors, except for the right central are incisal of their ideal location relative to the gingival margins of the cuspids bilaterally.

Figure 13. Lateral view demonstrating restorative needs.

Figure 14. In this lateral view, sufficient vertical room without bite raising for restoration is apparent.

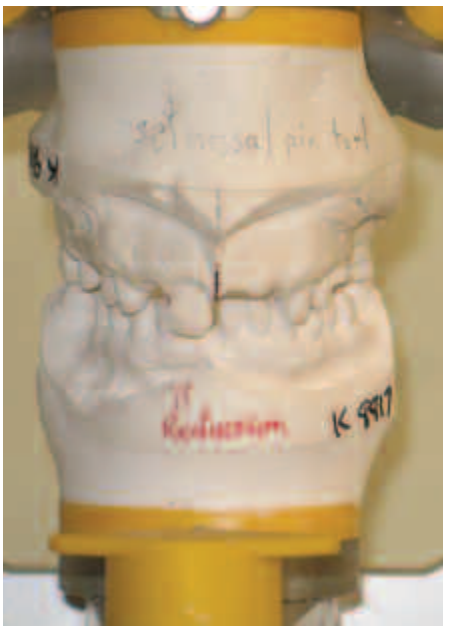

Figure 15. Adjustment of the model to determine final position of the incisal edge was planned for the "neutral zone."

Figure 16. Full contour waxup of the final restoration for diagnosis and to create the contours of the provisional restoration.

Figure 17. Anterior view of the second laboratory processed Radica provisional restorations.

Figure 18. Close-up and reflected view of the provisional restorations showing the high degree of esthetic possible.

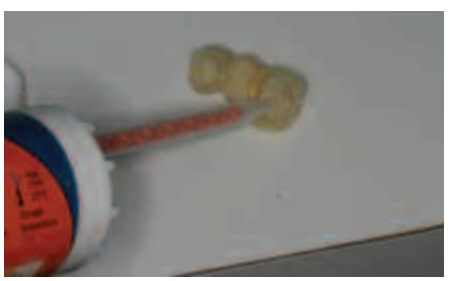

Figure 19. The bis-acryl provisionals are relined using the same technique used to bond to composite direct restorations including priming/bonding and application of flowable bis-acryl resin.

Figure 20. The relined restorations are seated in the mouth, allowed to self cure and then removed to trim to precise margins.

Figure 21. On the day of surgery the provisional restoration is seated, exerting pressure where necessary to direct the soft tissue to the contours planned on the diagnostic model.

Figure 22. The provisionals are removed at intervals of 2, 4, 8, and 16 weeks and checked for adequate soft tissue surface contour. They are relined to continue pressure in areas where required.

Figure 23. The bis-acryl provisionals can be polished with any composite polishing system or glazed with unfilled resin.

guide the soft tissue healing. Differential pressure along the edentulous ridge from the pontics guided the soft tissue to heal in a more apical direction and symmetrically. After 4 months the process of soft tissue management with the provisional is completed (Figures 24 and 25). The definitive restoration creates the illusion of a tooth emerging from healthy periodontal tissue (Figures 26–29).

Peri-Implant Tissue Guidance

In the absence of other limiting factors, the earlier that a provisional restoration can be placed on a dental implant the more likely it is that the resulting soft tissue will be aesthetically acceptable. Although some changes are possible at the time of second stage surgery (cover screw removal), the ideal time is at the time of implant placement. If the implant is placed into a fresh extraction site it may be even more predictable. In the absence of infection and the presence of adequate bone and soft tissue, the transition to an inconspicuous implant borne restoration is most predictable if the soft tissue is supported adequately by a provisional prosthesis beginning at the time the tooth is lost.

Case 4: Provisional Placement at time of Extraction and Implant Placement

This patient had injured his right central incisor and it had been restored with a crown and post (Figures 30 and 31). Fracture of the root necessitated extraction but the associated tissues were adequately healthy to permit the immediate placement of an implant at the time of tooth extraction. The same day that the tooth was extracted and the implant placed, the patient received a custom composite provisional restorations designed to mimic the natural tooth contours (Figures 32–35) in order that the soft tissue would be supported and guided during healing. The procedure for fabricating this restoration has been previously described[5] and it is accomplished with layering restorative bis-acryl composite with hybrid filler particles is shown by Fahl.[6,7] Following removal of the provisional at 6 months the natural appearance of the periodontal tissues is evident (Figure 36). The final restoration (Figure 37) predictably maintains the soft tissue contours.

Figure 24. The soft tissue healing is complete. The provisionals have been relined as needed to crate ideal contours as predicted in the diagnostic phase.

Figure 25. The ovate pontic receptor sites seen on the crest of the ridge were created by the relining of the bis-acryl provisionals.

Figure 26. The final restoration demonstrating the improved gingival tissue display.

Figure 27. The final restoration, retracted view demonstrating the gingival contours.

Figure 28. The final restoration demonstrating the illusion of teeth emerging from healthy periodontal tissue (right lateral view).

Figure 29. The final restoration demonstrating the illusion of teeth emerging from healthy periodontal tissue (left lateral view).

Case 5: Provisional Placement at Time of Second Stage Implant Surgery

This patient was congenitally missing the maxillary lateral incisors. At age 13 years the teeth were replaced with bonded fixed restorations (Figure 38). The restorations were removed (Figure 39) in order that implants could be placed in the spaces preserved by the bonded restorations at age 18 years. At the time of 2nd stage surgery the soft tissue was guided by a provisional restoration made of hybrid composite layered onto a provisional abutment as was done in case 4 (Figure 40).

In this case, the left lateral incisor had adequate soft tissue volume for an ideal result without soft tissue augmentation. At the time of 2nd stage implant surgery, there was found to be minimal soft tissue volume for the right lateral incisor; however. The connective tissue pedicle graft extending from the palate could have been used to create adequate soft tissue thickness in order that a provisional restoration could be used to guide the soft tissue healing following implant exposure (2nd stage surgery). The patient, however, refused the additional surgery deciding that the benefit of the surgery would be minimal.

The composite provisional can be easily reshaped to create contours for tissue support and guidance. It can be augmented and reshaped by air abrading the surface, silanating and bonding to the old composite. If sufficient soft tissue thickness is present, by increasing the profile of the emergence, the soft tissue moves apically, and by reducing the profile the soft tissue moves in an occlusal direction. These adjustments are made in the provisional in order that the contours can be finalized prior to the final impression. The resulting soft tissue contours are captured in the final impression

Figure 30. Initial presentation of the failing right central incisor.

Figure 32. Provisional restoration (labial view). It is important in creating the provisional restoration that the anatomy of the tooth be duplicated. Interdental tissue support is created by mesial and distal contours and distinct line angles and height of labial of soft tissue is maintained by correct emergence profile.

Figure 33. Provisional restoration (lingual view).

Figure 31. Initial presentation radiograph.

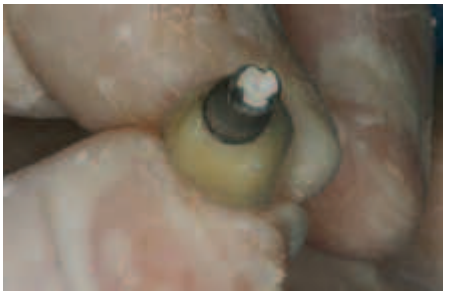

Figure 34. Provisional restoration (apical view).

Figure 35. Correct mesial and distal contours of the provisional restoration.

Figure 36. After 6 months the provisional restoration has created excellent soft tissue contours for the final prosthesis.

Figure 37. Final restoration.

using a rigid material, such as flowable light cure resin which is injected around the impression coping immediately after removal of the provisional, and then duplicated in the final restoration (Figure 41). The final restoration predictably achieves esthetic soft tissue profiles if there is adequate soft tissue to manipulate with the provisional restoration.

Conclusion

Patients demand that we provide improved esthetic services in restorative dentistry. With improved understanding of the biology, materials, and techniques to manage soft tissue during provisionalization it is possible to create a restoration that appears natural. The treatment planning for these procedures requires the coordination of specialist services.

The five cases presented demonstrate the management with provisionals, of soft tissue in cases which involve implants and those which do not, and in which the clinical situation permits management from the time of tooth loss and those which involve management until after the ridge is healed. All use bis-acryl composite technologies for the provisionalization procedures.

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Disclosure

The author delclares no competing financial interests.

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Figure 38. Bonded bridges replace the right and left lateral incisors.

Figure 39. Bonded bridges are removed and the ridges are ready for implants

Figure 40. Provisional bis-acryl crowns were placed on implants following 2nd stage implant surgery. Note the gingival margin is more incisal than ideal on the lateral incisors.

Figure 41. Final restoration of the maxillary lateral incisors. The provisional restorations were used to manipulate the soft tissue margins by adjusting the contour of the emergence profile. On the left incisor, where there was sufficient soft tissue, the tissue is ideal, on the right where there was inadequate labial soft tissue, the gingival margin placement is more incisal than the idea.

Computer-Assisted Implant Surgery:

Evolving Standards of Care

By Domenic Morielli, BSc, DDS, Certified Oral and Maxillo-Facial Surgeon

ABSTRACT

Historically, surgical and prosthetic considerations in implant treatment did not always intersect. This sometimes resulted in situations where a great deal of effort and imagination were required on the part of the restorative dentist to complete certain cases. Surgeons did not always have a good grasp of the prosthetic imperatives when placing implants. In addition, implant position and distribution were often decided at the time of surgery. Restorative dentists on the other hand sometimes had limited understanding of the surgical difficulties of placing implants in atrophic ridges or compromised sites. These problems were gradually addressed by the emergence of teams of surgeons and prosthodontists working in close collaboration, eventually resulting in more predictable outcomes. However, the developments of new materials and techniques have required a great deal of coordination and communication between surgeon and restorative dentist, a difficult task when those involved are not in the same office or at least close by. These, as well as many other concerns, are addressed by Nobel Biocare's NobelGuide system (NobelBiocare, Toronto, Ontario).

About the Author

Dr. Morielli is a graduate of McGill where he obtained a BSc in physiology as well as a DDS. After completing a multidisciplinary residency at St. Mary's Hospital, he went on to pursue his training in maxillofacial surgery at Laval University where he is a clinical professor in oral and maxillofacial surgery. In addition to maintaining a private practice, Dr. Morielli has lectured extensively on implant surgery and traumatic neuropathies of the trigeminal nerve.

Historically, surgical and prosthetic considerations in implant treatment did not always intersect. This sometimes resulted in situations where a great deal of effort and imagination were required on the part of the restorative dentist to complete certain cases. Surgeons did not always have a good grasp of the prosthetic imperatives when placing implants. In addition, implant position and distribution were often decided at the time of surgery. "I put them where the bone was," is a phrase often heard in the past but no longer acceptable today. Restorative dentists on the other hand sometimes had limited understanding of the surgical difficulties of placing implants in atrophic ridges or compromised sites. Surgical guides, when provided, did not always consider anatomical limitations, therefore obliging the surgeon to make preoperative decisions based on his or her understanding of the prosthodontics involved. These problems were gradually addressed by the emergence of teams of surgeons and prosthodontists working in close collaboration, eventually resulting in more predictable outcomes. The development of a wide range of prosthetic components, regenerative materials, and grafting techniques eventually allowed these teams to treat most situations. The advent of modern imaging technologies and anatomical radiographic guides further enhanced predictability by allowing implants to be placed relative to tooth position while at the same time respecting anatomical structures, that is, prosthetic-driven implant placement. All this, however, required a great deal of coordination and communication between surgeon and restorative dentist, a difficult task when those involved are not in the same office or at least close by. These, as well as many other concerns, are addressed by Nobel Biocare's NobelGuide system (NobelBiocare, Toronto, Ontario).

The amalgamation of 3-D imaging, computer-assisted planning, and stereolithographic surgical guide production for guided surgery is the basis for the NobelGuide concept.[1–3] Data resulting from a computed tomography (CT) scan are used to produce a computer-generated 3-D image of the patient's maxilla or mandible as well as that of a precise radiographic guide reflecting idealized tooth position. A double-scan technique is used whereby one scan is taken with the patient wearing the radiographic guide accurately positioned in place with a radiotranslucent bite registration wafer. A second scan is then taken of the guide alone. Gutta percha points inserted in the guide allow the computer to align it with the image of the patient's bone. The operator can then remove and replace the guide at will, as well as manipulate the 3-D image in various ways. I usually begin the general evaluation of the patient's bone at this time looking for obvious anomalies, ridge defects, residual roots, etc. I do this in the planning window using the left screen for gross evaluation, and I then quickly scroll through the entire jaw with the perpendicular re-slice function on the right screen (Figure 1). I then place the prosthesis on the image and once again scroll through the patient's jaw evaluating gross relationship between the residual crest and proposed tooth position (Figure 2). Various view options then permit a site-by-site analysis after placing implants based on preferred implant distribution (Figures 3–5). This comprises the first level of application of the NobelGuide concept (its use as a diagnostic tool). Bone volume and morphology relative to tooth position can be deemed inadequate and augmentation procedures can be planned if needed. Graft volume, material, and technique can then be determined. If, on the other hand, a large amount of bone is available, it may be decided to proceed to surgery by conventional techniques after converting the radiographic guide into a surgical guide. In my experience, implant inclination and depth must often be altered to achieve complete bone coverage, and accurately reproducing these inclinations on the radiographic guide is not an easy task.

The next level of the NobelGuide concept can then begin if prosthetic requirements as determined by the restorative dentist have been met. This condition can be verified in two ways. An image-capture function can be used to transmit images to the restorative dentist, or the whole case-planning file can be downloaded to a server that the restorative dentist can access and view the appropriate file. At this point, final implant position, type, and dimensions are determined. This information is then transferred via the Internet to NobelBiocare where a surgical guide is stereolithographically produced and returned to the operator (Figure 6). This guide is then placed on the patient's mounted casts and a bite registration wafer is fabricated to allow precise placement in the mouth at time of surgery. After verifying fit and adaptation, the guide is fixed trans-mucosally to the patient's bone by the use of guide pins whose positions are also determined during the planning phase. The guide is at this point precisely related in three dimensions to the underlying bone as visualized on the 3-D computer image (Figures 7 and 8).

Surgery can be undertaken as a flapless procedure when appropriate conditions exist. These include of course adequate bone volume and the presence of healthy immobile mucosa at the proposed implant sites. It is beyond the scope of this article to debate the necessity of having keratinized tissue surrounding the trans-mucosal components of the implants, although I believe this to be desirable. A flapless approach for implant placement has already been described elsewhere.[4,5] The first step in the surgical procedure consists of using a special drill whose function is to remove the mucosa overlying the implant sites while at the same time countersinking the crestal bone to accommodate the implant shoulder. This is done directly through the guide rings in the surgical guide contrary to the rest of the drilling sequence which uses drill-guides of diameters corresponding to the drills indicated for each site. I prefer using a tissue

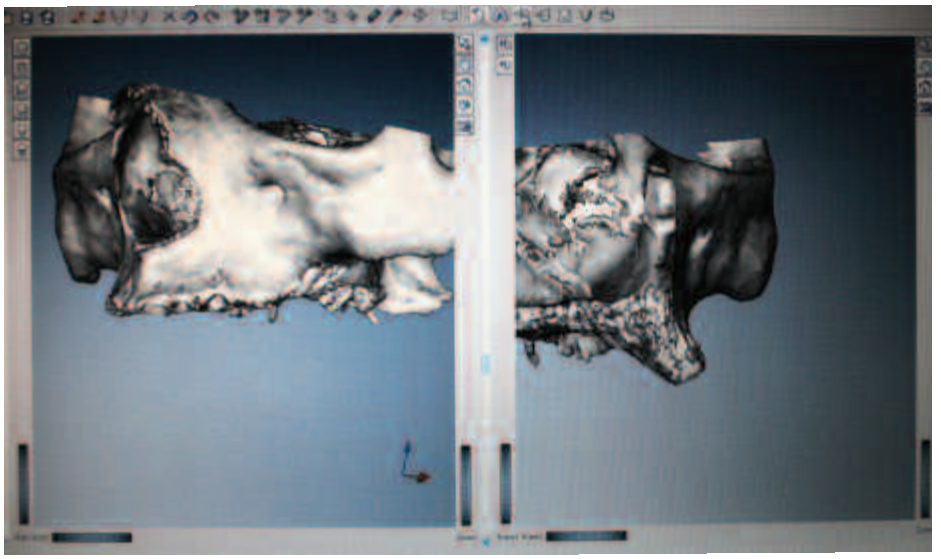

Figure 1. Planning window with 3-D view on left and 2-D view on right.

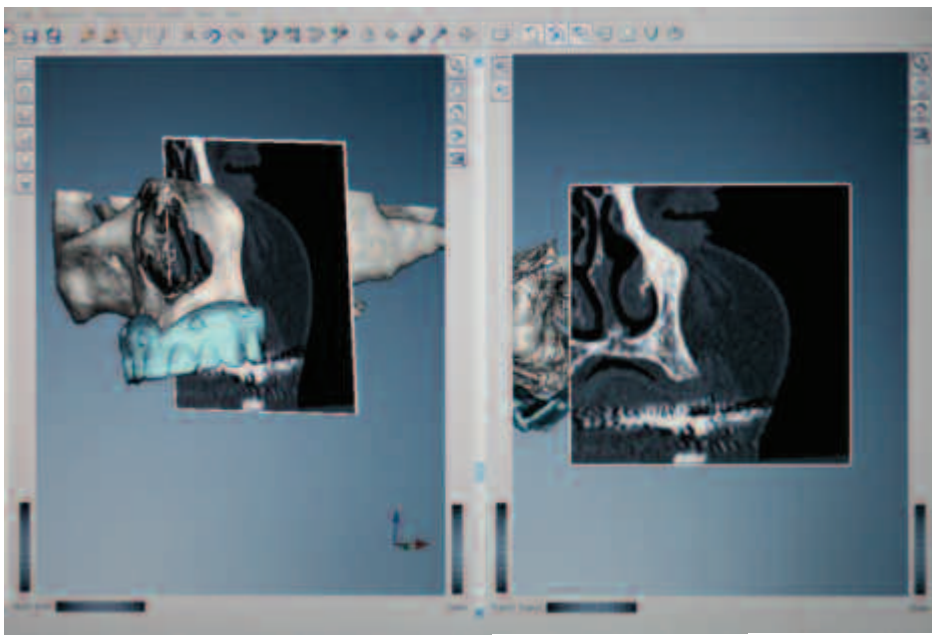

Figure 2. Perpendicular re-slice plane can be scrolled through the 3-D image and viewed on the right screen.

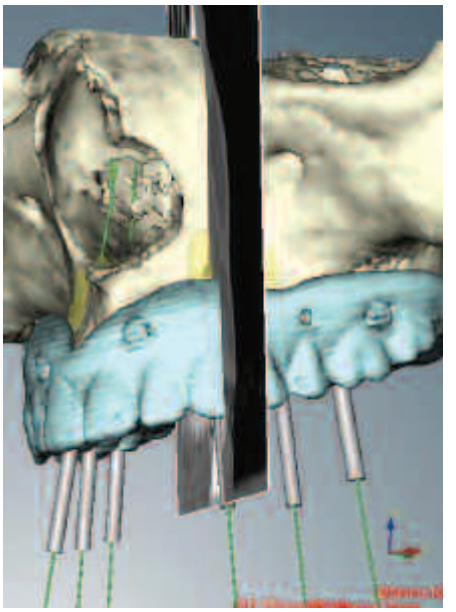

Figure 3. Perpendicular re-slice plane positioned at left canine site with guide in place.

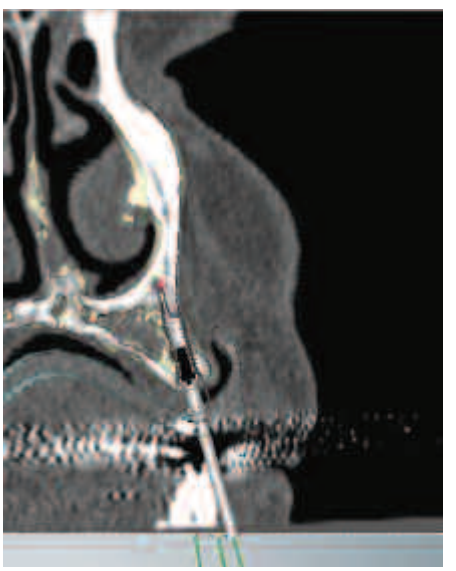

Figure 4. Implant positioned on right screen.

punch of appropriate diameter prior to this step to make tissue removal easier and more complete. The drill guides are inserted sequentially into the guide rings, and the drills are therefore guided through the bone in precisely the same axis as in the virtual image of the patient's jaw. The position and inclination of the implants are thus assured, while depth is limited by placing drill-stops on the drills prior to commencing. Note that the guide rings are embedded in the guide such that the platform of the implant is precisely 10 mm from the occlusal surface of these rings. All of the instrumentation involved is designed to fulfill this condition.

After completing the drilling sequence, an implant mount is fixed to the implants, which are then inserted through the guide rings without removing the guide. The implants are deemed to have attained proper depth when the shoulder of the implant mount comes into contact with the top of the guide rings. Because absolute congruency between the prepared sites and angle of implant insertion is impossible even with the NobelGuide technique, friction between the guide rings and the implant mounts can lead the operator to believe that the underlying bone is much denser than it is in reality. This can be very significant especially when the treatment plan involves the immediate placement of a fixed prosthesis, and one or more unstable implants may make this impossible. It has already been shown that immediate placement of a fixed prosthesis on stable implants is a valid option even in fully edentulous cases (see Figures 1–3, 6 and 7). After the implants are placed, I once again use a tissue punch

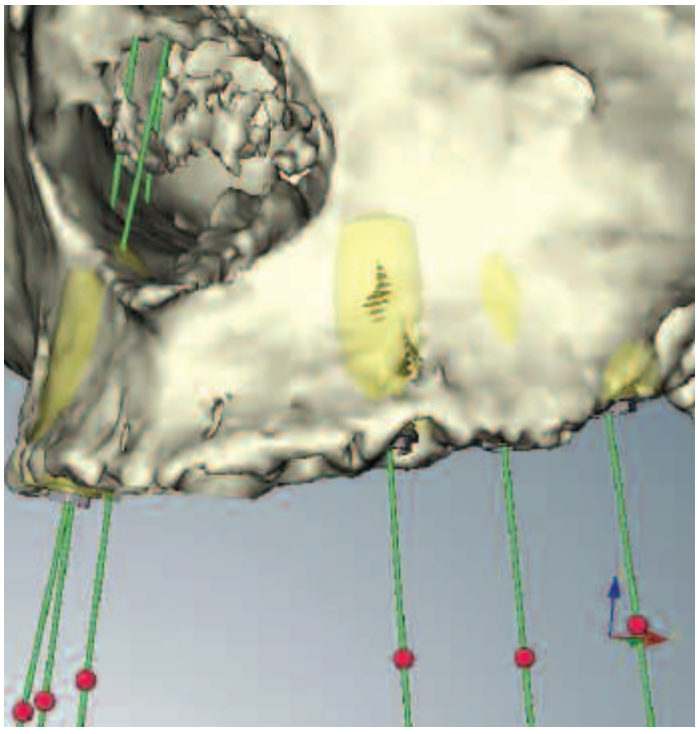

Figure 5. Implant can be seen to protrude through bone and should be repositioned.

Figure 6. Surgical guide with six guide rings and three guide pin channels.

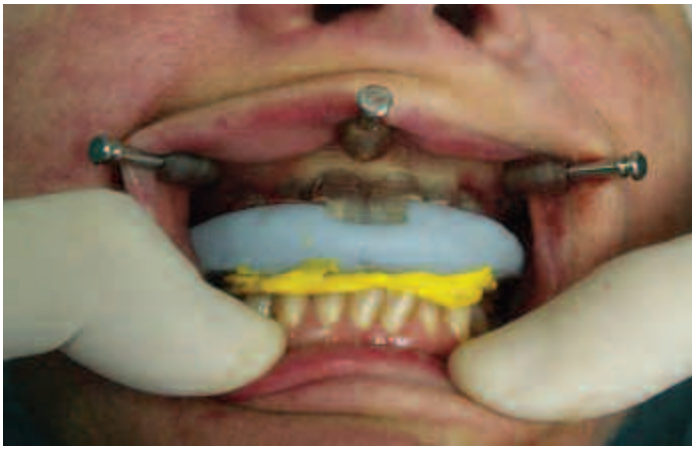

Figure 7. Surgical guide positioned by means of a bite registration produced on mounted models and secured by three guide pins.

Figure 8. An even blanching of the tissue beneath the guide is observed.

through the guide rings after carefully removing the implant mounts, then withdraw the surgical guide and remove any soft tissue debris overlying the head of the implants. It thus becomes much easier to place temporary abutments when indicated (Figure 9). This step is especially important if the third level of the NobelGuide concept is applied, that is, immediate fixation of a screw-retained prosthesis (Figures 10 and 11), as complete seating may be hampered by the presence residual soft tissue. The prosthesis is fixed by means of special expandable abutments that compensate for the slight incongruence between the true and planned position of the implants (Figure 12). When existing keratinized mucosa is insufficient, I have found it to be possible to use very conservative flaps in the maxilla to reposition palatal mucosa since the surgical guide allows me to place the implants without having to visually verify whether full bone coverage is possible.

The posterior mandible is one area where NobelGuide is of unquestionable value. Several parameters are involved in determining the feasibility of restoring this zone with implant-supported restorations. The first, and most important of course, is bone height above the inferior alveolar nerve canal. Damage to this structure by a drill or an implant can have dramatic consequences. Using NobelGuide to visualize the inferior alveolar nerve (IAN) and then drill and place the implants using guided surgery can minimize the risk to the patient. The nerve can be visualized and marked in various ways allowing an accu-

Figure 9. After surgery is completed, the guide is removed and temporary abutments are placed if no immediate prosthesis was planned.

Figure 10. Immediate prosthesis (occlusal view).

Figure 11. Immediate prosthesis (lateral view).

rate evaluation of the available bone above it before placing the implants in the planned positions. Other than IAN position, lingual concavities as well as crestal thickness and inclination can also be evaluated (Figures 13 and 14).

As with any new technique or procedure, there is a learning curve associated with NobelGuide. The steepness of this curve will depend on a number of factors including the operator's comfort with computers, as well as previous experience with implant surgery and restoration. The software portion can be quite a challenge for some, but a large part of the process can easily be delegated. In my practice, for example, my implant coordinator inputs patient CT scan data, examines the resulting images, and verifies that the radiographic guide was well adapted to the subjacent tissues during the scan. This having been done, I can use my time for diagnosis and placing implants on the 3-D image. This is actually quite straightforward as the implants can be moved or changed as often as one wishes until a satisfactory position is achieved or the treatment plan is altered.

Only basic experience with computers is required to perform this virtual surgery. A certain amount of surgical experience is however necessary because, as with any other procedure, unexpected situations may arise. It may, for example, not be possible to achieve primary stability for one or more implants. The operator must be able to deal with this or any other complication associated with conventional implant surgery and must always have a rescue plan for both the surgical and the prosthetic portion of the treatment. I have had to replace an implant with one with a larger diameter on two occasions and alter the position of an implant on one occasion after a buccal plate fracture during implant insertion. Had these cases involved an immediate prosthesis, it might have been impossible to deliver it if I did not have sufficient understanding of the prosthetics involved. Problems can arise even before planning begins. One that I have encountered on a few occasions is that the radiographic guide does not seat properly in the mouth. This, of course, is very serious since every subsequent step in the process will be skewed. I believe that it is imperative to take very accurate impressions and pour the cast as though it were a master cast for a multi-unit bridge. Alginate and plaster are not adequate materials for this situation.

In addition to its application as a diagnostic and planning tool, I also depend on NobelGuide to more easily convey to patients what their particular situation involves. When a patient can actually see a 3-D image of his or her residual ridge with a large portion of an implant surface protruding through it, explaining why a graft or augmentation procedure is required becomes much easier. The same is true when explaining the risk to the inferior alveolar nerve if the patient can see it cours-

Figure 12. Expandable abutment: as the abutment-screw is tightened, the four "wings" of the abutment's collar expand and engage the prosthesis thereby securing it to the implants.

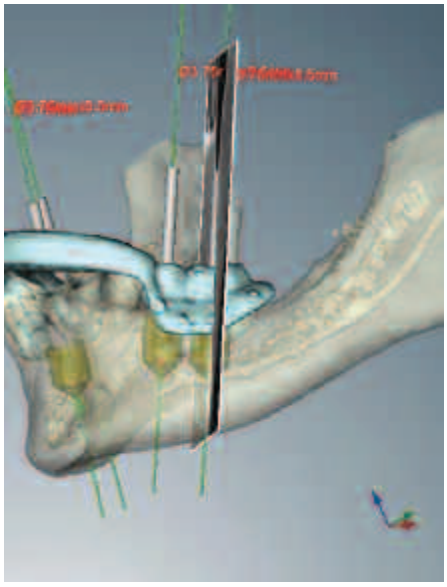

Figure 13. Transparency mode showing the inferior alveolar nerve coursing through the mandible.

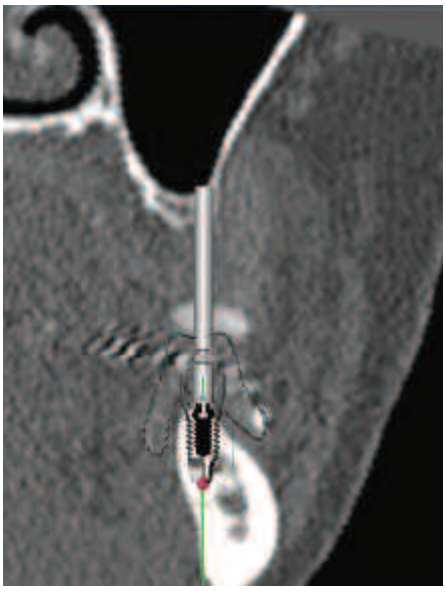

Figure 14. Perpendicular re-slice from Figure 13 showing implant position relative to the inferior alveolar nerve, residual crest, proposed tooth position, and lingual concavity.

ing through the mandible and the implants positioned above.

Conclusion

After using NobelGuide to the first, second, or third level in over 200 cases from single tooth to complete upper and lower edentation, I have found that it not only makes results more predictable but decreases the surgical time, minimizes the invasive nature of the surgery, and diminishes the risk to anatomic structures such as the IAN result with significantly reduced post-operative pain and morbidity for the patient. Although the cost for the radiographic guide, CT scan, and surgical guide can be close to 2,000 dollars, not a single patient has refused to proceed once the advantages were explained. Furthermore, as surgical component dimensions are determined at the planning stage, staff can place orders on an as-needed basis, minimizing the need for a large inventory. Because of the aforementioned reasons, I believe NobelGuide will quickly become the new standard of care in the planning and execution of implant cases, and it has become an indispensable tool in my practice.

Disclosure

The author declares no competing financial interests.

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Chirurgie d'implant assistée par ordinateur:

Des normes de soins en évolution

Par Domenic Morielli, BSc, DDS, Chirurgien buccal et maxillo-facial agrée

RÉSUMÉ

A travers l'histoire, les considérations chirurgicales et prothétiques dans le traitement par implant n'ont pas toujours convergé. Ceci aboutissait des fois à des situations qui exigeaient beaucoup d'efforts et beaucoup d'imagination du dentiste restaurateur pour finir certains cas. Les chirurgiens n'ont pas toujours eu une bonne perception des impératifs prothétiques quand ils mettaient en place des implants. En plus, la décision quant à la position de l'implant et à sa distribution était souvent prise au cours de l'intervention. Les dentistes restaurateurs, à l'opposé, avaient parfois une compréhension limitée des difficultés chirurgicales de la mise en place d'implants dans des crêtes atrophiques ou des sites fragilisés. Ces problèmes ont été graduellement résolus avec l'émergence d'équipes de chirurgiens et de prosthodontistes qui, en travaillant en étroite collaboration, ont éventuellement rendus possible des résultats prévisibles. Néanmoins, le développement de matériaux nouveaux et de techniques nouvelles a exigé une grande demande de coordination et communication entre le chirurgien et le dentiste restaurateur, difficile quand les personnes impliquées n'opèrent pas dans le même cabinet ou même à proximité. Le système NobelGuide de Nobel Biocare (NobelBiocare, Toronto, Ontario) répond à ces préoccupations ainsi qu'à d'autres.

L'auteur

Dr Morielli est promu de McGill University ayant obtenu un B.Sc. en physiologie ainsi qu'un D.D.S. Après avoir complété une résidence multidisciplinaire à St-Mary's Hospital, il poursuivit des études en chirurgie buccale et maxillofaciale à l'Université Laval, où il est professeur de la matière. En plus de maintenir une pratique privée, le Dr Morielli a donné de nombreuses conférences sur la chirurgie implantaire et les neuropathies traumatiques du nerf trijumeau.

A travers l'histoire, les considérations chirurgicales et prothétiques dans le traitement par implant n'ont pas toujours convergé. Ceci aboutissait des fois à des situations qui exigeaient beaucoup d'efforts et beaucoup d'imagination du dentiste restaurateur pour finir certains cas. Les chirurgiens n'ont pas toujours eu une bonne perception des impératifs prothétiques au moment de mettre en place des implants. En plus, la décision quant à la position de l'implant et à sa distribution était souvent prise au cours de l'intervention. "Je les place à l'endroit de l'os" est une phrase souvent entendue dans le passé mais aujourd'hui inacceptable. Les dentistes restaurateurs, à l'opposé, avaient parfois une compréhension limitée des difficultés chirurgicales de la mise en place d'implants dans des crêtes atrophiques ou des sites fragilisés. Les guides chirurgicaux, quand ils sont disponibles, n'ont pas toujours pris en considération les limitations anatomiques, obligeant le chirurgien à prendre des décisions préopératoires basées sur son ou sa perception de la prosthodontie impliquée. Ces problèmes ont été graduellement résolus avec l'émergence d'équipes de chirurgiens et de prosthodontistes qui, en travaillant en étroite collaboration, ont éventuellement rendus possible des résultats prévisibles. Le développement d'un large éventail de composants prothétiques, de matières régénératives, et de techniques de greffe, a éventuellement permis à ces équipes de traiter la plupart des situations. L'arrivée de technologies modernes d'imagerie et de guides radiographiques anatomiques a rehaussé la prévisibilité en permettant la mise en place d'implants relativement à la position de la dent tout en respectant les structures anatomiques, ceci étant, le placement d'implants dirigés par la prosthodontie. Toutefois, ceci exige une grande coordination et communication entre chirurgiens et dentistes restaurateurs, difficile et compliquée quand les personnes impliquées n'opèrent pas dans le même cabinet ou à proximité. Le système NobelGuide de Nobel Biocare (NobelBiocare, Toronto, Ontario) répond a ces préoccupations ainsi qu'à d'autres.

L'amalgamation de l'imagerie 3-D, la planification assistée par ordinateur, et le guide de production chirurgicale stereolithographique pour des chirurgies guidées sont les fondations du concept du NobelGuide.[1–3] Les données résultant du balayage tomodensitométrique sont utilisées pour produire une image générée par ordinateur en 3-D du maxillaire ou du maxillaire inferieure du patient, aussi bien que le guide radiographique précis réfléchissant la position idéale de la dent. Une technique à double scintigramme est utilisée, un scintigramme est pris du patient ayant le guide radiographique placé avec précision avec une plaquette métallique enregistrant la morsure radio transparente. Un deuxième scintigramme est ensuite pris avec le guide seulement. Les points du Gutta percha insérés dans le guide permettent à l'ordinateur de s'aligner avec l'image de l'os du patient. L'operateur peut ensuite enlever et remplacer le guide comme bon lui semble, et aussi manipuler l'image 3-D de plusieurs façons. Je commence généralement l'évaluation de l'os du patient à ce moment là, essayant de retrouver des anomalies évidentes, des défauts de crêtes, des racines résiduelles, etc. Je fais ceci dans la phase de planification en utilisant l'écran à gauche pour l'évaluation sommaire, et ensuite je défile à travers toute la joue avec la fonction de vue anatomique perpendiculaire sur l'écran à droite (Figure 1). Je place ensuite la prothèse sur l'image et encore une fois je défile sur la joue du patient(e) pour évaluer les relations sommaires entre la crête résiduelle et la position proposée de la dent (Figure 2). Des options variées de vue permettent ensuite une analyse site par site après le placement d'implants en distribution préférée (Figures 3–5). Ceci compose le premier niveau d'application du concept NobelGuide (son utilisation en tant qu'outil de diagnostic). Le volume de l'os et la morphologie relative à la position de la dent peuvent-être considérés inadéquats et des procédures d'augmentation peuvent être planifiées le cas échéant. Le volume du greffon, la matière, et la technique peuvent être déterminés. D'autre part, si une grande masse d'os est disponible, la décision pourrait être prise d'aller de l'avant avec l'intervention avec des techniques classiques suite à la conversion du guide radiographique en guide chirurgical. Mon expérience m'a appris que l'inclinaison et la profondeur de l'implant sont souvent altérées pour réussir une couverture complète de l'os, et reproduire de manière précise ces inclinaisons dans le guide radiographique n'est pas facile.

Le niveau suivant du concept du NobelGuide peut alors être entamé si les exigences prosthétiques, telles déterminées par le dentiste restaurateur, sont réunies. Cet état est constaté par deux moyens. Une fonction de capture d'image est utilisée pour transmettre les images au dentiste restaurateur, le dossier complet de la planification du cas est téléchargé à un serveur auquel le dentiste restaurateur peut avoir accès et revoir le dossier approprié. A ce stade, la position de l'implant, son type et ses dimensions sont déterminées. Cette information est ensuite transférée via l'internet à NobelBiocare ou un guide chirurgical est produit stereolithographiquement et renvoyé à l'operateur (Figure 6). Ce guide est ensuite placé dans les modèles montés du patient et une gaufrette d'enregistrement en cire d'occlusion est fabriquée afin de permettre un placement précis dans la bouche au cours de l'intervention. Après vérification de l'ajustement et de l'adaptation, le guide est fixé à l'os du patient en utilisant les ergots du guide dont les positions sont aussi déterminées durant la phase de planification. Le guide est jusqu'ici lié précisément en trois dimensions à l'os sous-jacent comme on peut le voir sur l'image par ordinateur en 3-D (Figures 7 and 8).

La chirurgie est prévue en tant que procédé sans lambeaux quand les conditions appropriées sont présentes. Ceci comprend bien sur le volume de l'os et la présence de muqueuse saine et immobile aux sites proposés de l'implant. Ce n'est pas du champ de discussion de cet article de débattre de la nécessité d'avoir du tissue kératinisé autour des composants transmucosaux des implants, toutefois je crois que ceci est

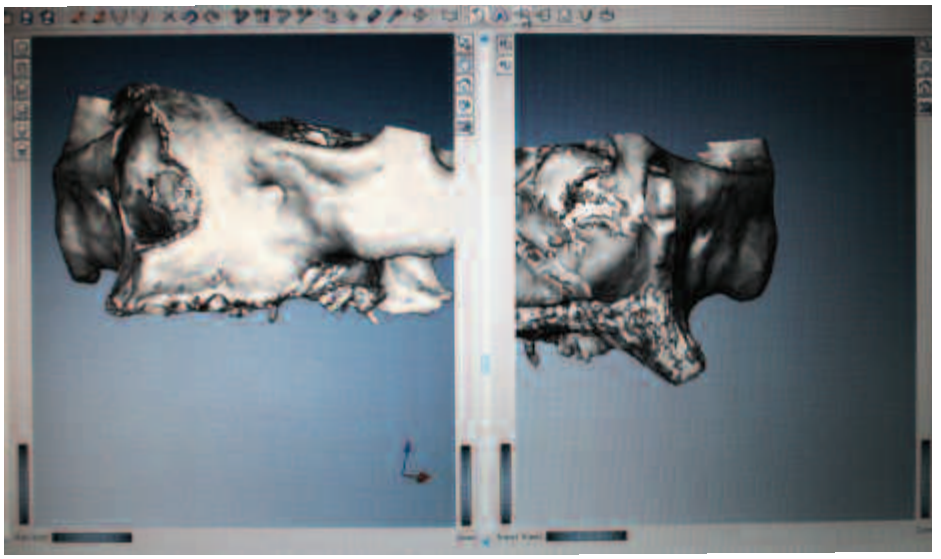

Figure 1. La fenêtre de planification avec vue en 3-D à gauche et vue en 2-D à droite.

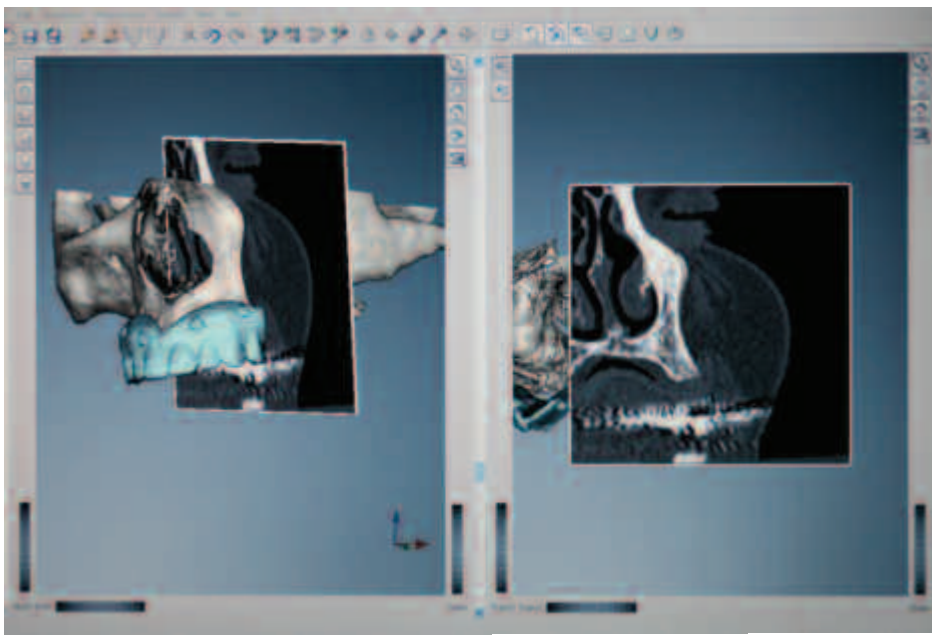

Figure 2. Le plan de recoupe perpendiculaire défile à travers l'image en 3-D et vue sur l'écran à droite.

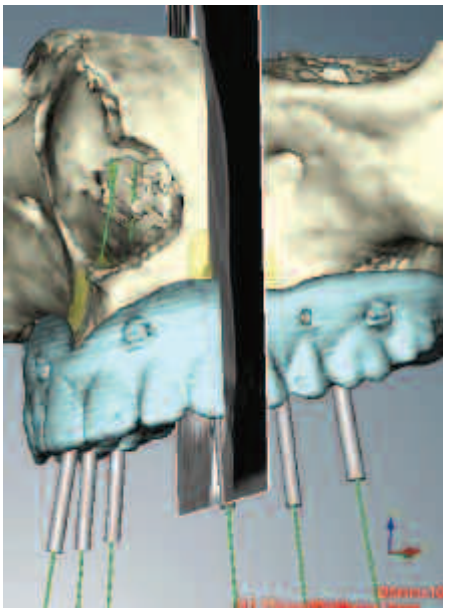

Figure 3. Le plan de recoupe perpendiculaire est positionné à gauche du site de la canine avec le guide en place.

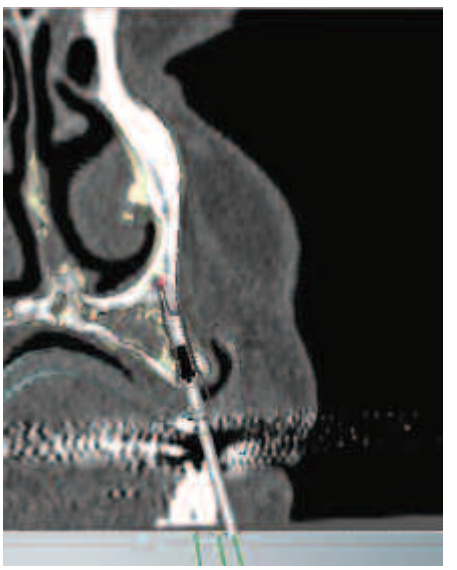

Figure 4. L'implant est positionné sur l'écran à droite.

souhaitable. Une approche sans lambeaux pour le placement des implants a déjà été décrite ailleurs.[4,5] La première étape de la procédure chirurgicale consiste a utiliser un foret spécial dont la fonction est d'enlever la muqueuse sus-jacent les sites de l'implant tout en en contreperçant la crête de l'os pour permettre l'épaulement de l'implant. Ceci est fait directement à travers les anneaux du guide dans le guide chirurgical contrairement au reste de la séquence du foret qui utilise les guides forets dont les diamètres correspondent aux forets correspondant à chaque site. Je préfère utiliser un emporte-pièce de diamètre approprié avant cette étape pour faciliter et mieux compléter l'extraction du tissue. Les guides des forets sont insérés de façon séquentielle dans les anneaux du guide, par conséquent les forets sont guidés à travers l'os précisément dans le même axe que dans l'image virtuelle de la joue du patient. La position et l'inclinaison des implants sont ainsi assurées, tout en limitant la profondeur en plaçant des arrêts de forets avant d'avancer. Notez que les anneaux du guide sont inclus dans le guide de façon à ce que la plateforme de l'implant est précisément à 10 mm de la surface occlusale de ces anneaux. Toute l'instrumentation impliquée est conçue pour remplir cette condition.

Une fois la séquence de perforation complétée, une monture d'implant est fixée aux implants, qui sont ensuite insérés à travers les anneaux du guide sans ôter le guide. Les implants sont censés avoir la profondeur appropriée quand l'épaulement de la monture de l'implant entre en contact avec le haut des anneaux du guide. Étant donné

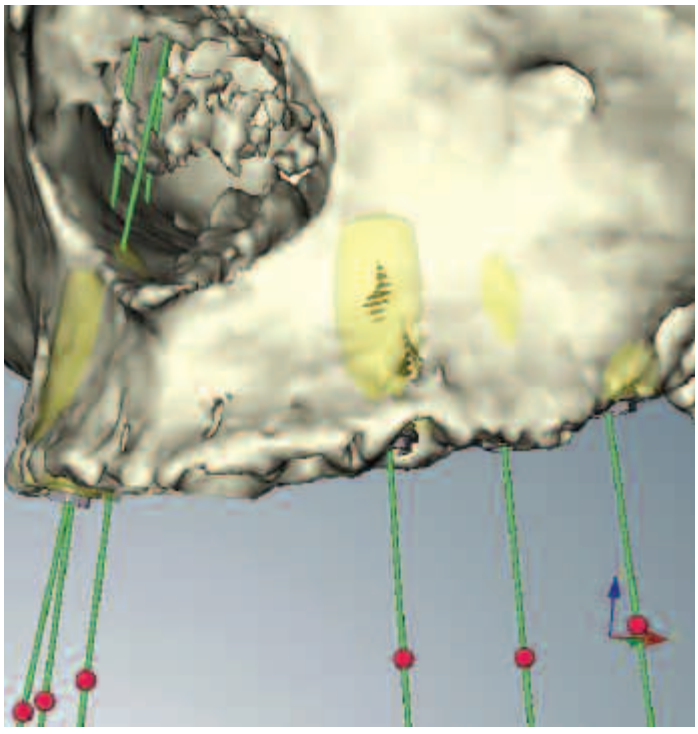

Figure 5. L'implant peut être vu en saillie à travers l'os et devrait être repositionné.

Figure 6. Le guide chirurgical avec six anneaux du guide et trois ergots des canaux du guide.

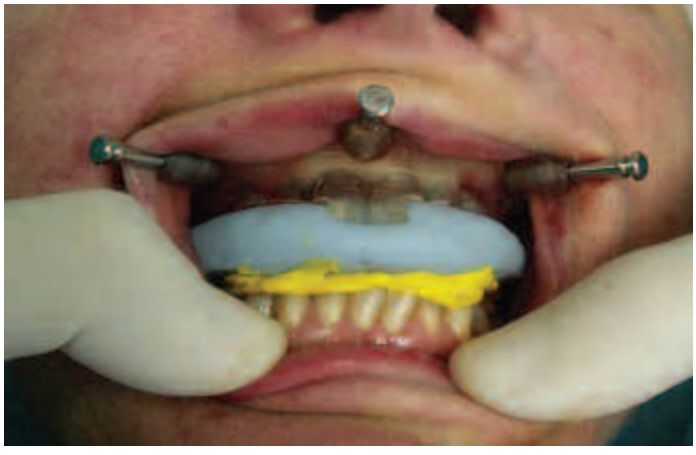

Figure 7. Le guide chirurgical est positionne pour montrer l'enregistrement de la morsure produite sur des modèles montes et sécurisés par trois ergots du guide.

Figure 8. Une perte régulière de coloration du tissue sous le guide est observée.

qu'une congruence absolue entre les sites préparés et l'angle d'insertion de l'implant est impossible même avec la technique NobelGuide, les frictions entre les anneaux du guide et les montures de l'implant peuvent porter l'operateur à croire que l'os susjacent est plus dense que ce qu'il est en réalité. Ceci pourrait être très significatif spécialement quand le traitement implique le placement immédiat d'une prothèse fixe, et un implant instable ou plus peut rendre ceci impossible. On a déjà montré qu'un placement immédiat d'une prothèse fixe sur des implants stables est une option valide même dans des cas complètement édentés (voir Figures 1–3, 6 et 7). Une fois les implants placés, j'utilise encore une fois un perforateur de tissue à travers les anneaux du guide après avoir extrait soigneusement les montures d'implants, ensuite je retire le guide chirurgical et j'enlève tout débris de tissue mou sus-jacent le dessus des implants. Il est ainsi plus facile de placer des piliers temporaires quand c'est indiqué (Figure 9). Cette étape est spécialement importante si le troisième niveau du concept de NobelGuide est appliqué, ceci étant, une fixation immédiate d'une prothèse à vis inclus (Figures 10 et 11), sachant qu'un appui complet peut être retardé par la présence de tissu mou résiduel. La prothèse est fixée par des piliers extensibles spéciaux qui compensent l'incompatibilité légère entre la réalité et la position planifiée des implants (Figure 12). En cas de muqueuse kératinisée insuffisante, j'ai trouvé qu'il était possible d'utiliser des lambeaux très conservateurs dans la maxillaire pour repositionner la muqueuse palatine étant donné que le guide chirurgi-

Figure 9. Une fois la chirurgie complétée, le guide est retiré et des piliers temporaires sont placés, si aucune prothèse immédiate n'est planifiée.

Figure 10. Prothèse immédiate (Vue occlusale).

Figure 11. Prothèse immédiate (Vue latérale).

cal me permet de placer les implants sans avoir à vérifier visuellement si la couverture totale de l'os est possible.

La mâchoire inferieure postérieure est une des sections ou NobelGuide a une valeur inébranlable. Plusieurs paramètres sont impliqués pour déterminer la faisabilité de la restauration de cette zone par des restaurations soutenues d'implants. Le premier, et le plus important bien entendu, est la taille de l'os au-dessus du canal du nerf dentaire inferieur. Tout dommage infligé à cette structure par une perforation ou un implant peut avoir des conséquences dramatiques. L'utilisation de NobelGuide pour visualiser le nerf dentaire inferieur (NDI), ensuite la perforation et l'emplacement des implants à l'aide d'une chirurgie guidée minimisent les risques pour le patient ou la patiente. Le nerf est visualisé et marqué de plusieurs façons permettant une évaluation précise du l'os disponible au-dessus avant de placer les implants dans les positions planifiées. En plus de la position du NDI, les concavités linguales, l'épaisseur des crêtes ainsi que l'inclinaison sont évaluées (Figures 13 et 14).

Comme pour toute technique ou intervention nouvelle, une période d'apprentissage est associée avec NobelGuide. La difficulté de cette période dépend de plusieurs facteurs dont le confort de l'operateur par rapport aux ordinateurs, et aussi l'expérience antérieure avec la chirurgie d'implants et la restauration. Le volet logiciel est tout un défi pour certains, mais une bonne partie du processus peut facilement être déléguée. Par exemple, dans mon cabinet, mon coordinateur ou ma coordinatrice d'implants entre les données du scintigramme du patient ou de la patiente, examine les images résultantes, et vérifie que le guide radiographique était bien adapté aux tissus sous-jacents durant le balayage. Ceci étant fait, je peux utiliser mon temps pour le diagnostique et le placement des implants dans l'image 3D. Ceci est plutôt simple étant donné qu'on peut déplacer et changer les implants comme bon nous semble jusqu'à ce qu'on arrive à une position satisfaisante ou que le plan de traitement est altéré.

Seule une expérience de base avec les ordinateurs est exigée pour exécuter cette chirurgie virtuelle. Toutefois, une certaine expérience en chirurgie est nécessaire du fait que, comme pour toute autre intervention, des situations inattendues peuvent survenir. Par exemple, il se peut qu'on n'arrive pas à une stabilité primaire pour un ou plusieurs implants. L'operateur doit être capable de prendre des mesures dans ce cas ou dans toute autre complication associée avec la chirurgie conventionnelle d'implant et doit toujours avoir un plan de secours pour les parties chirurgicales et prothétiques du traitement. J'ai eu à remplacer un implant par un autre qui avait un plus grand diamètre à deux reprises et j'ai eu à altérer la position d'un implant une fois après la fracture d'une plaque buccale durant l'insertion d'implant. Si ces cas avaient impliqué une prothèse immédiate, il aurait été peut-être impossible d'exécuter si je n'avais pas une compréhension suffisante de la prothèse impliquée. Les problèmes peuvent survenir avant même que la planification ne commence. Un problème auquel j'ai fait face à certaines occasions est celui du guide radi-

Figure 12. Piliers extensibles: comme le vis – pilier est serré, les quartes "ailes" du collier du pilier s'étendent et impliquent les prothèses avoisinantes en les sécurisant aux implants.

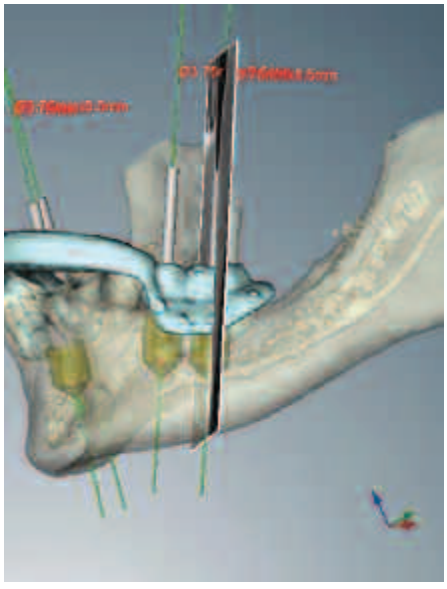

Figure 13. Le mode transparent montre le nerf dentaire inferieur traversant la mandibule.

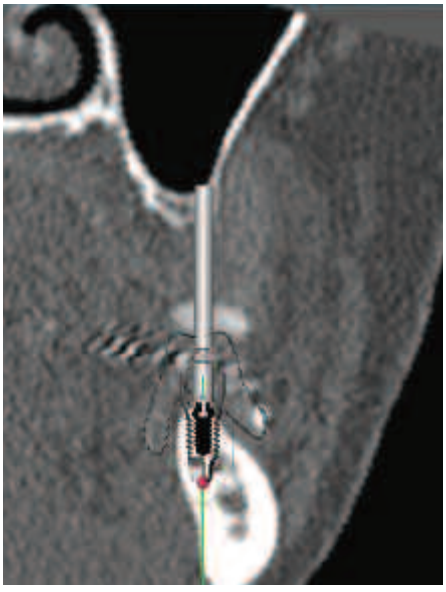

Figure 14. Coupe perpendiculaire de la Figure 13 montrant la position de l'implant par rapport au nerf dentaire inferieur, la crête résiduelle, la position proposée de la dent et la concavité linguale.

ographique qui ne se pose pas de manière appropriée dans la bouche. C'est très sérieux, du fait que toute étape subséquente dans le processus sera asymétrique. Je crois qu'il est impératif de prendre des impressions très précises et verser le modèle comme si c'était un modèle principal pour un pont avec piliers multiples.. L'alginate et le plâtre ne sont pas des matériaux appropriés pour cette situation.

En plus de son application comme outil de diagnostic et de planification, je me sers aussi du NobelGuide pour communiquer plus facilement aux patients les implications de leurs cas spéciaux. Quand un ou une patiente voit effectivement sa crête résiduelle en image 3-D avec une grande partie de la surface de l'implant en protrusion, expliquer la nécessité d'une greffe ou d'une intervention d'addition devient plus aisé. Ceci est aussi vrai quand on explique les risques pour le nerf dentaire inferieur si le patient peut le voir retrouver sa course à travers la mâchoire inferieure et les implants placés au-dessus.

Conclusion

Après avoir utilisé NobelGuide au premier, deuxième, ou troisième niveau dans plus de 200 cas de la dent individuelle à l'édentement complet supérieur et inferieur, J'ai réalisé que non seulement ça rend les résultats plus prévisibles mais diminue le temps des chirurgies, minimise la nature invasive de l'intervention, et diminue les risques anatomiques tel les résultats du NDI avec la réduction significative de la douleur postopératoire et la morbidité chez le ou la patiente. Même si le coût du guide radiographique, le scintigramme et le guide chirurgical peut avoisiner les 2000 dollars, pas un seul patient n'a refusé d'aller de l'avant une fois les avantages expliqués. Plus encore, étant donné que les dimensions des composants chirurgicaux sont déterminées durant la phase de planification, le personnel peut placer les commandes au besoin, minimisant ainsi les grands inventaires. Toutes les raisons citées ci haut, me font croire que NobelGuide va devenir très rapidement la nouvelle norme de soins dans la planification et l'exécution des implants, et c'est aujourd'hui un outil indispensable dans mon cabinet.

Divulgation

L'auteur affirme n'avoir aucun conflit d'intérêt financier.

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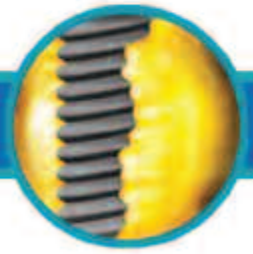

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