CJRDP JCDRP

Canadian Journal of Restorative Dentistry & Prosthodontics

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

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Journal canadien de dentisterie restauratrice et de prosthodontie

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

Implant Dentistry / Dentisterie implantaire

Practice Management/ Gestion de cabinet

VOLUME 3 - 2
Spring/printemps, 2010

PEER-REVIEWED - JOURNAL - REVUE DES PAIRS

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VOL 3, NO.2 • SPRING/PRINTEMPS, 2010

Official Publication of the Canadian Academy of Restorative Dentistry and Prosthodontics

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PUBLICATIONS AGREEMENT NUMBER 40025049
ISSN 1916-7520

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Comprehensive Treatment Planning in Implant Dentistry: Would a Workshop be Beneficial?

Doctor, does your patient need dental implants or does your patient need an implant-supported prosthesis? Therein lies the answer.

Swedish prosthodontists placed the first implant-supported prosthesis in the mid-60s and they, along with their international prosthodontist colleagues, remain instrumental to this day in the advancement of contemporary implant dentistry. In the late 70s, Dr. George Zarb, now a retired professor of prosthodontics from the University of Toronto and a well published researcher and educator in this field, addressed the Association of Prosthodontists of Canada (APC) at a Montréal annual meeting on the topic of osseointegrated dental implants and the technology arising from the Brånemark Institute based in Göteborg, Sweden. Canadian prosthodontists, well ahead of their American counterparts, were encouraged by this enthusiastic keynote speaker about integrating such predictable dental implant technology into their own practices and teaching environments.

Implant dentistry continues to be prosthodontically driven since patients consult for rehabilitations of their deficient oral functions and esthetics. However, the ADA and the CDA have not recognized implant dentistry as a distinct dental specialty. Rather, they initially advocated that implant dentistry ought to be mainstreamed within the various existing specialties or into a general dentistry practice. Based on this resolution, provincial professional regulatory bodies, did not see fit to require formal university implant dentistry training other than limited CE courses, mostly devoid of clinical evaluations. So, it fell upon a small number of prosthodontist-educators, themselves apostles of implant dentistry of the 80s and 90s, to make room in their regular undergraduate programs, then to initiate CE courses, with the aim of transferring to the profession at large, the scientific and clinical precepts of contemporary implant dentistry.

To begin with, prosthodontists had to aggressively convince surgeons to embark on implant training in order to incorporate the surgical aspect of patients' treatment plans, often directly or indirectly sponsoring the emergence of implant surgical services nationwide. Dental implant manufacturers, looking to reach North American markets, rejoiced. Among some dental faculties, however, the well-meaning prosthodontic pioneers were regarded as "implant pushers" which created dissidence between the passionate innovators and their indifferent fellow academics and administrators.

Subsequently, once this specialty driven phase had completed its mission, with a majority of oral surgery practices trained, equipped, and eager to advance,

unforeseen ramifications ensued; general practitioners started to be energetically recruited by the industry for the purpose of providing extensive patient referral pools to keep surgeons busy and interested in implant dentistry.

Merit was then bestowed by the industry on the overall knowledge and capabilities of surgeons regarding implant dentistry, thereby leading to in-office study groups where general practitioners were invited to bring in their patient cases so that surgeons would plan all aspects of treatment, including the prosthodontic. Every so often, a phone call to the implant manufacturer might be deemed necessary in order to verify some prosthetic component or laboratory procedure and that seemed to be enough for all concerned.

Consequently, at the start of the new millennium, surgical and general dentists were stealthily becoming best suited to plan and execute extensive, comprehensive, rehabilitative implant treatments. Eventually, implant surgeons at large began involving denturists to feed their patient pools. Many proclaimed that prosthodontics is a dead specialty! Why did this happen? Were we prosthodontists asleep at the helm? Was it inevitable? Avoidable?

Is this the aftermath of what the ADA and the CDA had in mind when they deliberately surrounded implant dentistry with a grey zone? Over the past three decades, as a clinical prosthodontist, a good portion of my practice has dealt with patient remakes, including implant dentistry cases. How come? Why do these implant-supported prosthetic remakes, as well as non-implant remake cases, ultimately end up with prosthodontists? Is the last resort what prosthodontists are destined to become? For the sake of the patient, and for no other ulterior motive, this is where comprehensive treatment planning involving prosthodontic extensive rehabilitation cases should have started in the first place. Instead, I imagine, plenty more prosthodontists, have to deal with maltreated, anxious, and at times depressed patients, necessitating the most delicate professional interventions, not to mention our professional expertise in litigation issues that have become par for the course in our workload.

It is beyond me that a practitioner would presume to be competent in the field of implant dentistry if he or she does not master comprehensive treatment planning and the related clinical skills affecting the natural dentition. Why not collaborate with a prosthodontist, to establish a treatment sequence and mutually agree to implement the proper treatment plan inclusive of the referring dentist and participating surgeon? Not only would this interaction become professionally enriching but would, first and foremost, benefit the patient. For instance, why replace three upper anteriors with implant-supported restorations when there is a diagnosed and untreated posterior bite collapse affecting the overall dentition? Overtreatment or downright malpractice lawsuits can and should be avoided with proper comprehensive treatment planning. Not every edentulous case (full or partial) calls for implants. With all of the professional resources available, there is no excuse for such violations.

Are prosthodontists becoming obsolescent with regards to evaluating and mastering contemporary implant prosthodontics? Are you, in your own dental practice, comfortable with the management of implant prosthodontic cases and proficient at executing the various stages of a comprehensive treatment plan? *Would a workshop on all of these matters be productive? Let me know your thoughts and suggestions.*

Dr. Hubert Gaucher
Editor-in-Chief

MESSAGE DU RÉDACTEUR EN CHEF

Plan de traitement compréhensif en implantologie dentaire : un atelier serait-il bénéfique?

Docteur, votre patient a t-il besoin d'implants dentaires ou d'une prothèse implanto-portée? La réponse réside dans la question elle-même.

Les prosthodontistes suédois ayant posé en bouche la première prothèse sur implants vers le milieu des années 60 continuent de jouer, avec leurs collègues internationaux, un rôle dans les progrès de l'implantologie. Vers la fin des années 70, le Dr George Zarb, maintenant professeur retraité de prosthodontie à l'Université de Toronto et chercheur publié, a fait une présentation à la réunion annuelle de l'Association des prosthodontistes du Canada (APC) à Montréal sur l'ostéointégration et la technologie issue de l'Institut Brånemark

situé à Göteborg en Suède. Les prosthodontistes canadiens, bien en avance sur leurs collègues américains, ont été encouragés par ce conférencier de marque enthousiaste, à intégrer cette technologie fiable dans leur pratique et dans leur enseignement.

L'implantologie continue d'être dictée par la prosthodontie puisque les patients consultent en raison d'une mauvaise fonction ou de l'aspect esthétique de leurs dents. Toutefois, l'ADA et l'ADC n'ont pas reconnu l'implantologie comme une spécialité dentaire distincte. Plutôt, ils ont décrété que l'implantologie ne doit pas être une classe à part et devrait s'intégrer, ou bien aux diverses spécialités qui existent, ou à même une pratique générale. En vertu de cette résolution, les organismes de règlementation des professions à l'échelle provinciale n'ont pas cru nécessaire d'exiger une formation universitaire formelle en implantologie autre que les cours limités d'éducation continue, lesquels ne comportent pas, pour la plupart, d'évaluations cliniques. Ainsi, il incombe à un petit nombre de prosthodontistes-éducateurs, eux-mêmes apôtres de l'implantologie des années 80 et 90, d'incorporer dans leurs programmes réguliers de premier cycle, puis de préparer des cours d'éducation continue, les préceptes scientifiques et cliniques de l'implantologie contemporaine.

Au début, ce sont les prosthodontistes qui devaient convaincre les chirurgiens de suivre une formation sur implants afin d'incorporer l'aspect chirurgical des plans de traitement des patients, parrainant ainsi, directement ou indirectement, l'essor des services en implantologie à l'échelle nationale. Les fabricants d'implants dentaires, cherchant à rejoindre les marchés de l'Amérique du Nord, étaient comblés. Parmi certaines facultés dentaires, les pionniers en prosthodontie implantaire étaient vus comme des «pousseux d'implants», ce qui a engendré une dissidence entre les innovateurs passionnés et leurs collègues universitaires et administrateurs.

Ensuite, une fois cette phase de spécialité accomplie, avec une majorité de pratiques en chirurgie buccale formée, équipée et fière de progresser, des ramifications inattendues se sont produites. Les omnipraticiens ont commencé à être recrutés par l'Industrie dans le but de fournir un grand nombre de patients aux chirurgiens pour les occuper et les intéresser à l'implantologie.

Le mérite a donc été conféré par l'Industrie sur les connaissances et les capacités des chirurgiens. Ceci a entraîné des groupes d'étude en cabinet où les généralistes étaient invités à présenter leurs cas pour que les chirurgiens planifient tous les aspects du traitement, y compris les traitements prosthodontiques. À l'occasion, une communication téléphonique au fabricant d'implants pouvait être nécessaire afin de vérifier certaines composantes prothétiques ou une procédure en laboratoire, et cela semblait suffire aux personnes concernées.
Par conséquent, au début du nouveau millénaire, les dentistes généralistes et les chirurgiens buccaux étaient bien placés pour planifier et exécuter des traitements implantaires extensifs et complets de réadaptation. Les chirurgiens en implantologie ont commencé à viser les denturologistes afin d'augmenter leurs banques de patients. Plusieurs ont proclamé que la prosthodontie était une spécialité morte! Pourquoi cela s'est-il produit? Est-ce que les prosthodontistes dormaient à la barre? Était-ce inévitable? Était-ce évitable?
Est-ce qu'il s'agit du regain que l'ADA et l'ADC avaient en tête lorsqu'ils ont délibérément placé l'implantologie dans une zone grise? Au cours des trente dernières années, en tant que prosthodontiste clinicien, une bonne portion de ma pratique a été consacrée à des réfections de cas d'implants. Comment se fait-il? Pourquoi ces cas d'implants échoués finissent-ils entre les mains d'un prosthodontiste? Est-ce que les prosthodontistes ne sont que des derniers recours? Pour le patient, et pour aucune autre considération, c'est précisément là que la planification du traitement de cas nécessitant un traitement prosthodontique élaboré aurait dû commencer. Plutôt, moi-même et, j'imagine, plusieurs autres prosthodontistes, devons composer avec des patients anxieux, parfois même sérieusement déprimés, ayant reçu des traitements médiocres. Ces patients nécessitent nos interventions spécialisées des plus délicates, si ce n'est notre expertise professionnelle en matière de litiges, devenus chose courante dans notre charge de travail.
Je n'arrive pas à comprendre qu'un praticien puisse présumer être compétent en implantologie s'il ne maîtrise pas la planification du traitement ni les compétences cliniques correspondantes concernant la dentition naturelle. Pourquoi ne pas collaborer avec un prosthodontiste pour établir une séquence adéquate de traitements à laquelle le dentiste référant et le chirurgien participeraient? Non seulement cette interaction serait-elle enrichissante du point de vue professionnel, mais bénéficierait avant tout le patient. Par exemple, pourquoi remplacer trois dents antérieures de l'arcade supérieure par des restaurations implanto-portées lorsqu'il y a affaissement de l'occlusion postérieure diagnostiqué et non traité affectant toute la dentition? Un surtraitement ou des poursuites pour faute professionnelle sont évitables s'il y a planification compréhensive du traitement. Les patients partiellement ou complètement édentés ne sont pas tous candidats pour implants. Avec toutes les ressources professionnelles à notre disposition, il n'y a aucune raison pour de telles infractions.

Les prosthodontistes sont-ils désuets en matière de l'évaluation et de la maîtrise de la prothèse dentaire en implantologie? Êtes-vous, dans votre propre pratique, à l'aise avec les traitements implantaires et suffisamment expérimenté pour exécuter les différentes étapes d'un plan de traitement compréhensif? *Un atelier sur ces sujets serait-il productif? J'aimerais connaître vos commentaires et suggestions.*

Dr Hubert Gaucher
Rédacteur en chef

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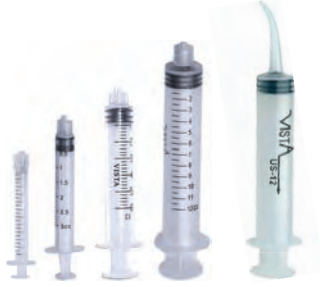

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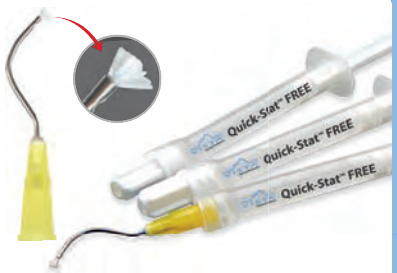

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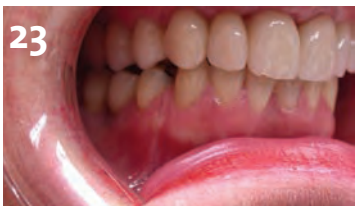
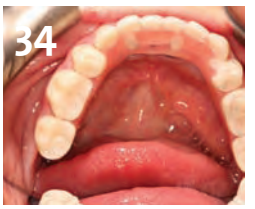
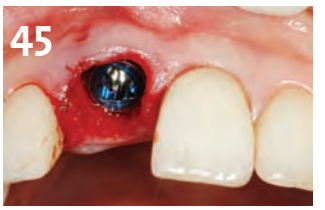
Spring / Printemps, 2010







FEATURES/ARTICLES

Implant Dentistry / Dentisterie implantaire

Practice Management / Gestion de cabinet

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INDICATES PEER REVIEWED/
INDIQUE REVUE DES PAIRS

Oral Implantology: Today and Tomorrow

As dental professionals, we are indeed privileged to be in the midst of a growth in the dental sciences such as we are presently witnessing. The exponential increase in scientific information and advances in clinical procedures are driven by the ever increasing desire for men and women to retain their youth and vitality while they stretch the limits of what we understand to be a normal, healthy, and productive life. Oral implantology, or implant-supported dentistry, has emerged as a standard of care and a fundamental resource for the construction dental solutions that are capable of providing the greatest potential for health, function, and longevity.

As you know, the field of oral implantology is complex. While advances are being made every day, the propagation of new information and clinical techniques is mired in the fact that the majority of clinicians who restore implants have a limited knowledge of the surgical phases, and those skilled in the surgical phases have limited knowledge of the restorative phases. That is most unfortunate considering that the examination, diagnoses, and treatment planning phase, to be optimal, requires comprehensive knowledge of all phases of treatment. The number of dental professionals considered to be expert in both the surgical and prosthetic phases of oral implantology is few indeed. Therefore, the need for professional collaboration and a multidisciplinary approach to treatment planning is more essential than ever.

My goal is to provide you with authors addressing both science and techniques that are in use today as well as those which are considered to be leading edge and relevant to the benefit of your practice and benefit to public which has entrusted us to their oral care.

The theme for this issue is "Oral Implantology: Today and Tomorrow." Today, our reasonable expectation is that any titanium-based implant can osseointegrate. In my opinion, there exists no perfect implant and the key to success lays in understanding their individual advantages and limitations. The science of bone grafting is well understood, but the management of interdental papillae and other soft tissue factors have yet to be fully controlled. We are at the threshold of implementing the science and a variety of procedures which will make each and all of these factors more manageable. Yet, in the face of poor patient compliance, compromised systemic health, and one of the most hostile environments in the human body, we are challenged to exact solutions as they are conceived on treatment plans.

We are privileged to provide articles by some of the leading researchers and clinicians who are developing technology eminently useful in developing clinical procedures which will bring higher levels of predictable success to our procedures in oral implantology.

One of our contributors is Dr. Robert Miller, not new to the *CJRDP*. A world-class lecturer, he is also a researcher in implant design and in implant surface technology which he will expand upon in his article.

Another is Dr. Astley Smith who has expanded on the works of Drs. Robert Marx and Aron Gonshor in developing higher concentrations of platelet rich plasma. He is the very first person to predictably harvest autologous thrombin to be used to re-coagulate blood products for enhancing bone grafting and soft tissue procedures.

Dr. Dennis Nimchuk's article "Achieving Initial Implant Stability: Observations on the Effect of Implant Body Macro-Design and Osteotomy Design" addresses implant designs and their direct influence on predictable successes in relation to the various encountered bone qualities. The author suggests that the selection of an implant based on macro-design features might have site specificity relevance.

Dr. Fortin's article, along with co-authors, Drs. Kenji Higuchi and Richard Sullivan describe their contribution in both surgery and prosthodontics. Alternatives to bone grafting procedures are illustrated with a relevant retrospective documentation.

Dr. Hubert Gaucher and Certified Dental Technician Nicolas Tardif address the advances made with milled titanium bars, replacing cast gold alloy bars with better accuracy and strength.

In addition to our oral implantology theme, we also have the second article in a series by Jo-Anne O'Connor-Webber, a practice management consultant who provides guidance to effectively manage practices as well as how to work with patients to give

them the best opportunity to approve your treatment plans.

I look forward to continuing the lineage of excellent researchers and clinicians with the hope that you receive value in the investment of your time reading these articles. Your comments and feedback are greatly appreciated.

Ronald J. Zokol, DMD, ABOI, FACD
Implant Section
Editor
Guest Co-editor

Implantologie dentaire : aujourd'hui et demain

En tant que professionnels dentaires, nous sommes en fait privilégiés de nous trouver au cœur d'une croissance des sciences dentaires qui prend forme et dont nous en sommes les témoins. L'augmentation exponentielle de l'information scientifique et les progrès réalisés dans les interventions cliniques sont dictés par un désir toujours croissant pour les hommes et les femmes de garder la jeunesse et la vitalité tout en dépassant les limites de ce que nous comprenons comme étant une vie normale, saine et productive. L'implantologie dentaire ou prothèse sur implants a fait surface comme une norme de traitement et une ressource fondamentale pour les solutions de reconstruction dentaire pouvant être les plus avantageuses pour la santé, le fonctionnement et la longévité.

Comme vous le savez sans doute, le domaine de l'implantologie dentaire est complexe. Bien que des progrès soient réalisés chaque jour, la diffusion de nouvelles informations et de techniques dentaires se perd dans le fait que la majorité des cliniciens qui restaurent les implants ont des connaissances limitées des phases chirurgicales et que ceux qui ont des compétences en chirurgie ont des connaissances limitées dans les phases de restauration. Ce qui est très malheureux étant donné que l'examen, le diagnostic et la phase de planification du traitement, pour être optimaux, exigent d'excellentes connaissances de toutes les phases du traitement. Le nombre de professionnels dentaires considérés comme étant des experts dans les phases chirurgicales et prosthodontiques de l'implantologie dentaire est limité. Par conséquent, la nécessité de collaborer et d'adopter une approche multidisciplinaire à la planification du traitement est plus essentielle que jamais.

Mon but est de trouver des auteurs qui aborderont les sujets scientifiques de même que les techniques qui sont utilisées de nos jours ainsi que celles qui sont considérées comme à la fois avant-gardistes, pertinentes à votre pratique et avantageuses pour les patients qui nous ont confié leurs soins dentaires.

Le thème de ce numéro est « Implantologie dentaire : aujourd'hui et demain ». De nos jours, on s'attend à ce que tout implant à base de titane puisse produire une ostéointégration. Selon moi, il n'existe pas d'implant parfait et la clé du succès se trouve dans la compréhension des avantages et des limites individuelles. La science de la greffe osseuse est bien comprise, mais il reste encore à maîtriser complètement la gestion des papilles interdentaires et des autres facteurs des tissus mous. Nous sommes au point de mettre en application la science et une variété d'interventions, ce qui permettra à tous ces facteurs d'être plus gérables. En présence d'une observance médiocre de la part du patient, d'une santé générale compromise, et l'un des milieux les plus hostiles du corps humain, nous devons trouver les solutions exactes au fur et à mesure qu'elles sont conçues sur les plans de traitement.
Nous sommes privilégiés de pouvoir fournir

des articles rédigés par des chercheurs et cliniciens renommés qui mettent au point une technologie utile pour l'élaboration de procédures cliniques qui permettront à nos interventions en implantologie dentaire d'atteindre des niveaux de réussite prévisible plus élevés.

L'un de nos auteurs, Dr Robert Miller, est un conférencier de renommée internationale, un chercheur en conception et en technologie de surface des implants dentaires. Il abordera ces sujets dans son article. Ce n'est pas la première fois que le Dr Miller offre sa contribution au JCDRP.

Le Dr Astley Smith a élargi l'application des travaux des docteurs Robert Marx et Aron Gonshor dans le but de développer des concentrations plus élevées de plasma riche en plaquettes. Il est le premier à avoir récolté de la thrombine autologue pouvant être utilisée pour coaguler à nouveau les produits sanguins dans le but d'améliorer la greffe osseuse et les interventions aux tissus mous.
L'article du Dr Dennis Nimchuk « L'atteinte d'une stabilité initiale de l'implant : observations sur l'effet du macro-design du corps de l'implant et de l'ostéotomie » traite de la conception des implants et de leur influence directe sur le succès prévisible en relation avec les diverses qualités des os. L'auteur suggère que la sélection d'un implant basée sur les caractéristiques de macro-design peut avoir une pertinence spécifique au site.

L'article du Dr Fortin et des co-auteurs, les docteurs Kenji Higuhi et Richard Sullivan décrit la contribution de ces derniers dans les domaines de la chirurgie et de la prosthodontie. Les solutions de rechange à la greffe osseuse sont illustrées et documentées rétrospectivement.

Le Dr Hubert Gaucher et Nicolas Tardif, technicien dentaire agréé, traitent des progrès réalisés avec les barres de titane usinées, remplaçant les barres d'alliage d'or coulé avec plus de précision et de force.
En plus de notre thème sur l'implantologie dentaire, nous avons un deuxième article d'une série rédigé par Jo-Anne O'Connor-Webber, consultante en gestion de pratique, qui offre des conseils pour gérer efficacement votre pratique et travailler avec les patients pour qu'ils puissent approuver vos plans de traitement.

Je souhaite pouvoir continuer à dénicher d'excellents chercheurs et cliniciens en espérant que vous retiriez quelque avantage à lire ces articles. Vos commentaires sont appréciés.

Ronald J. Zokol, DMB, ABOI, FACD
Rédacteur – section implantologie
Co-rédacteur invité

2010 Journal Issue Announcement

Annonces des parutions du Journal 2010

SUMMER ISSUE: Dental Research /
PARUTION ÉTÉ: Recherche dentaire

Contact: Dr. Hubert Gaucher: hgaucher@sympatico.ca

Due Date for Submissions: August 3rd, 2010 / Soumissions 3 août 2010

FALL ISSUE: Occlusion /
PARUTION AUTOMNE: Occlusion

Contacts: Dr. Kim Parlett: kptooth@muskoka.com;
Dr Hubert Gaucher: hgaucher@sympatico.ca

Due Date for Submissions: November 1st, 2010 / Soumissions 1 novembre 2010

2011 Journal Issue Announcement

Annonces des parutions du journal 2011

WINTER ISSUE: Esthetic Dentistry /
PARUTION HIVER: Dentisterie esthétique

Contacts: Dr. Paresh Shah: shah@mts.net;
Dr. Hubert Gaucher: hgaucher@sympaticoca

Due Date for Submissions: February 4, 2011 / Soumissions 4 fevrier, 2011

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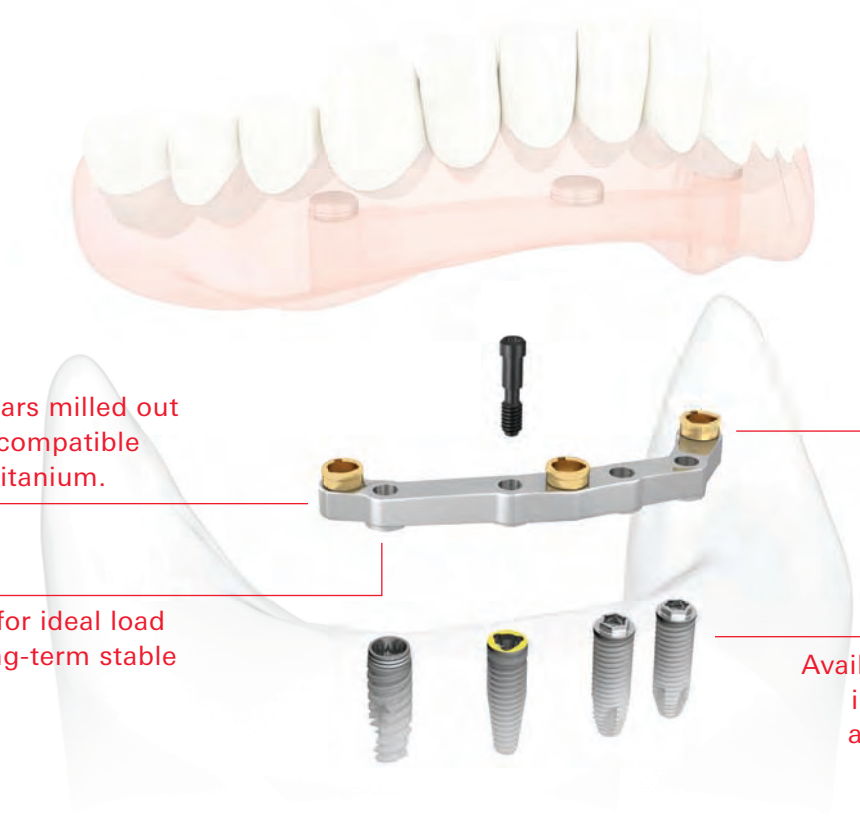

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*Clinical screws are only included for Nobel Biocare implants. **Availability of attachments may differ from country to country depending on regulatory clearance. However, all bars are delivered pre-tapped to accept the desired attachments.

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Join us in Calgary this October!

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2010 Annual Scientific Meeting
October 14th - 16th, Calgary, Alberta

Meeting Theme: "Real World Dentistry 2010 and Beyond"

Hands-On Course

DENTSCAPE: Dental Photography for Dentist-Laboratory Communication

Presented by Mr. Naoki Aiba, CDT, Oral Design

- **October 14th, 9:00 pm – 5:00 pm, Calgary Westin Hotel**
- **Cost: $ 300.00 Per Person – Space is Limited**
- ***7 CE credits to be issued***
- ***Bring your Own Camera and Flash to exercise photo shooting. Breaks and a one hour lunch to be provided***

Synopsis: "Dental photography" is not just taking photographs but also maximizing the use of them. An award-winning professional photographer and ceramist, Naoki Aiba, CDT will explain the fundamental of dental photography, and explore its use in daily practice by illustrating numbers of clinical cases fabricated solely with photographic information without seeing the patients. In this seminar, the participants are welcomed to bring their own camera and flash to exercise photo shooting with him.

Course Outline:
- *Lecture "Dentscape: Dental Photography for Functional Esthetic," which illustrates:*
- *Basic science of photography*
- *Photographic equipments and useful accessories*
- *Basic technique of dental photography*
- *Concept and use of the "Shade View" photographs*
- *Photos and study cast for designing pleasing midline and incisal edge line*
- *Photo protocol for dentist-laboratory esthetic communication by case design*
- *Shooting profile and settings of major manufacturers' camera and flash systems*
- *Clinical case studies*
- *Demonstration & Hands-on:*
- *Set up of your camera system for the best exposure*
- *Test shooting the Basic protocol (facial and intraoral photography)*
- *Simple 4-step photo enhancement with Photoshop CS3 (for Mac users) and Photoshop Elements 5.0 (for Windows users).*

Learning Objectives:
- *To learn how to communicate with esthetic elements through photography between dentists and laboratory for fabrication of restorations.*
- *To understand how to overcome three most prominent esthetic challenges: Shade mismatch, canted mid-line, and unpleasing incisal edge line.*
- *To understand the concept and the use of "Shade View" to read, map, and analyze the information into ceramic fabrication.*
- *Learning the simple Photoshop workflow of the pictures into the dentist-laboratory communication.*

Attendees: *Restorative dentists, laboratory technicians, dental assistants who takes photographs.* ***Participants are welcomed to bring their own camera and flash to exercise photo shooting***

Mr. Naoki Aiba, CDT, Oral Design
Born in Nagoya, Japan, Naoki Aiba graduated from the Dental Technology Program at the Dental School of Aichi Gakuin University in Nagoya in 1982 and completed the post-graduate ceramics course at the Tokai Dental Technicians School in 1986. He received the Young Speaker of the Year Award in 1989. In 1992, Mr. Willi Geller selected Naoki to be a member of Oral Design. He has lectured, conducted hands-on courses, published in more than thirty countries on ceramics, dental photography and dentist-laboratory communications. He has published and exhibited his photographs around the world. He currently serves as a member of the Editorial Board for the QDT and is a Technical Advisory Board Member of the Monterey-Bay Salinas Study Club. He maintains his laboratory, Science Art, Inc. in Monterey, California, and offers hands-on .

Social Activities

Thursday, October 14th

Horse Back Riding – Moose Mountain Adventures
8:00 am - 2:00 pm - **Registrant and/or Partner/Guest Event**
Located in Bragg Creek, Alberta, between Calgary and Banff National Park, treat yourself with an extraordinary day and experience the Kananaskis Country on horseback.

Fly Fishing on the Bow River
7:30 am - 5:00 pm - **Registrant and/or Partner/Guest Event**
The Bow River, just downstream of Calgary, Alberta, Canada, is one of the top three trout streams in the world, harbouring the most consistently large river run trout you will ever catch.

Welcome Buffet at The Westin Calgary Hotel

6:00 – 10 pm - **Registrant and Partner/Guest Event**
Kicking off this Year's Scientific Meeting will be our Opening Reception hosted in the Calgary Westin Hotel, join your Meeting Sponsors, other registrants and guests to rekindle old acquaintances and make new.

Friday, October 15th

Tour, Dine & Shop - Kananaskis & Canmore!
9:00 am - 2:30 pm - **Partner/Guest Event**
Kananaskis Country and Canmore
Be sure to bring your Camera so you don't miss any of the breathtaking scenery.

Wild Western Night - Wainright Hotel, Heritage Park
6:00 pm - 10:00 pm - **Registrant and/or Partner/Guest Event**
Discover "How the West was Once" at Canada's largest living history museum, travelling back in time from the 1950s to the 1860s

Saturday, October 16th

President's Gala
6:30 pm - **Partner/Guest Event**
Gala will offer a sumptuous menu featuring a variety of Calgary's finest Cuisine. Don't forget your dancing shoes as you'll enjoy the sounds of Fun in the Front Seat, one of Alberta's Hottest Dance Bands.

Table Clinics—Saturday, October 16
Topics

- The ingenious stress free bar system on implant
- Simple steps on how to make bonding of indirect restorations predicatble and easy.
- Emergence profile development with tempoization in highly aesthetic zone using Astra temporary abutment
- DENTSCAPE: Dental Photography for Dentist-Laboratory Communication
- Diagnostics and Treatment of Obstructive Sleep Apnea Therapy Ulilizing Oral Appliances
- Cone Beam Imaging for Surgical and Prosthetic Planning
- Digital Age in Dentistry
- In Office Fabricated Appliances
- Treating Incisal Attrition, Fracture, and Augumentation with Composite Resin

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Congrès annuel 2010
14 au 16 octobre, Calgary, Alberta

Thème du congrès: La dentisterie pragmatique: aujourd'hui et au-delà

Cours pratique

La photographie dentaire pour une communication dentiste-laboratoire

Présenté par M. Naoki Aiba, CDT, Design Oral

- **Le 14 octobre, 09h00 – 17h00, Calgary Westin Hotel**
- **Coût: 300$ pp – Places limitées**
- **7 crédits de formation continue**
- **Apportez votre appareil photo avec flash pour les pratiques. Collations et repas du midi seront fournis**

Synopsis: La photographie dentaire n'implique pas seulement la prise de photos mais aussi leur mise en valeur. En tant que photographe et céramiste professionnel qui s'est mérité plusieurs prix d'excellence, Naoki Aiba expliquera les fondements de la photographie dentaire et explorera son utilité dans la pratique quotidienne en illustrant des cas cliniques fabriqués uniquement avec l'information photographique, sans voir les patients. Les participants sont bienvenus d'apporter leur appareil photo et flash afin de pratiquer sur place.

Aperçu: Dentscape:

- *La photographie dentaire qui soutient l'esthétique fonctionnelle*
- *La science de la photographie*
- *Équipement et accessoires photographiques*
- *Techniques de base de la photographie dentaire*
- *Le concept et l'utilisation de photographies Shade View*
- *Photos et modèles d'étude de bons designs de lignes médianes et rebords incisifs*
- *Protocole photographique pour communiquer au laboratoire un design esthétique*
- *Profils et réglages de certaines grandes marques d'appareils et de flash*
- *Cas d'études cliniques*
- *Démonstration et manipulation*
- *Réglages de votre caméra pour la meilleure exposition*
- *Protocole de base de photographie faciale et intra-orale*
- *Améliorations des photographies en 4 étapes: Avec Photoshop CS3 (pour Mac) et Photoshop Elements 5.0 (pour Windows)*

Objectifs

- *Communiquer les éléments esthétiques d'une restauration au laboratoire à l'aide de la photographie*
- *Surmonter trois défis esthétiques: Mauvaises teintes, lignes médianes inclinées et rebords incisifs inadéquats*
- *Lire, planifier et analyser les informations de Shade View pour la fabrication céramique*
- *Apprendre la simplicité de Photoshop pour communiquer entre dentiste et laboratoire*

Participants: *Dentistes en restaurations, techniciens de laboratoires, assistants dentaires qui prennent des photos.* ***Les participants sont encouragés d'apporter leur propre appareil photo et leur flash.***

Mr Naoki Aiba, CDT, Oral Design
Né à Nagoya au Japon, Naoki Aiba receva son diplôme du programme de technologie dentaire de l'école Aichi Gakuin à Nagoya en 1982 et compléta un cours en porcelaine de deuxième cycle à Tokai Dental Technicians School en 1986. En 1989 on lui présenta le prix Young Speaker of the Year et en 1992, il fut choisi par M. Willi Geller, pour devenir membre de Oral Design. M. Aiba a donné des conférences et des cours pratiques et est publié dans plus de trente pays sur la céramique, la photographie dentaire et les communications entre dentistes et laboratoires. Ses photographies sont publiées et affichées partout dans le monde. Il est sur le conseil d'administration du QDT et du Monterey-Bay Salinas Study Club. Il a son laboratoire, Science Art Inc., à Monterey en Californie et offre des cours pratiques à son installation de formation, Oral Design Monterey.

Programme Social

Jeudi le 14 octobre

Équitation – Moose Mountain Adventures
08h00 – 14h00 - **Pour membres inscrits ou conjoints/invités**
À Bragg Creek, entre Calgary et le parc national de Banff, faites l'expérience extraordinaire d'une journée d'équitation dans le paysage de Kananaskis.

Pêche à la mouche sur le Bow River

07h30 – 17h00 - **Pour membres inscrits ou conjoints/invités**
La rivière Bow, en aval de Calgary, est l'un des trois meilleurs cours d'eau du monde pour la grosse truite de rivière.

Buffet de bienvenue au Westin Calgary

18h00 – 22h00, **Pour membres inscrits, conjoints/invités**
Pour ouvrir le congrès de cette année, nous vous offrons une réception à l'hôtel même, où vous pourrez rencontrer nos commanditaires ainsi que les autres membres et invités.

Vendredi le 15 octobre

Excursion, repas, magasins – Kananaskis et Canmore
09h00 – 14h30 - **Pour conjoints/invités**
N'oubliez surtout pas votre appareil photo pour saisir ces splendides paysages.

Soirée Western – Hôtel Wainwright, Heritage Park

18h00 – 22h00 - **Membre inscrit et conjoint/invité**
Découvrez l'ouest de jadis en reculant dans le temps, à compter de 1950 jusqu'à 1860.

Samedi le 16 octobre

Gala du Président

18h30 - **Avec conjoint/invité**
Venez festoyer avec un menu vous offrant un assortiment des meilleurs plats de Calgary et une soirée dansante animée par Fun in the Front Seat, l'un des meilleurs orchestres de danse de l'Alberta.

Démonstrations cliniques - Samedi le 16 octobre

Thèmes

- Le système ingénieux de la barre passive sur implants
- Des étapes simples pour l'adhésion de restaurations indirectes de façon facile et prévisible
- Dévelopement de profil d'émergence pour la temporisation dans les régions hautement esthétiques utilisant les piliers temporaires Astra
- DENTSCAPE: La photographie dentaire pour la communication dentiste-laboratoire
- Le diagnostic et le traitement de l'apnée du sommeil obstructive à l'aide d'appareils buccaux
- L'imagerie Cone Beam pour la planification chirurgicale et prothétique
- L'âge numérique en dentisterie
- Appareils intra-oraux fabriqués sur place
- Le traitement de l'attrition incisive et de la fracture, et l'augmentation de la dimension verticale avec de la résine composite

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2010 Annual Scientific Meeting
October 14th - 16th, Calgary, Alberta

Meeting Theme: "Real World Dentistry 2010 and Beyond"

Friday Feature Speaker

Dr. David Gaber, DMD

Dr. David Garber is a member of the internationally recognized multidisciplinary group of educators known as "Team Atlanta." He is the recipient of the 2005 Gordon J. Christensen Lecturer Recognition Award, the American College of Prosthodontics Distinguished Lecturer Award, the Northeastern Periodontal Society Isador Hirschfeld Award for Clinical Excellence, the Greater New York Academy of Prosthodontics Distinguished Lecturer Award, and the David Serson Medal of Research. He is a past President of the American Academy of Esthetic Dentistry and has served on the boards of both the AAED and the American Academy of Fixed Prosthodontics.

Dr. Garber is clinician and professor in the Department of Periodontics as well as in the Department of Oral Rehabilitation at the Medical College of Georgia. He is a Clinical Professor in the Department of Prosthodontics at Louisiana State University as well as in the Department of Restorative Dentistry at the University of Texas in San Antonio. He is past Editor of the Journal of Esthetic Dentistry and co-author of Porcelain Laminate Veneers, Bleaching Teeth, Porcelain and Composite Inlays and Onlays, and Complete Dental Bleaching, and has published over 60 articles and textbook chapters.

Topic: ***"Real World Dentistry: 2010 and Beyond"***

Synopsis: Real World Dentistry 2010: Choices, Options and Alternatives

Today's changing world in dentistry involves innovative clinical techniques coupled with an ever-evolving group of new products. A return to "needs-based dentistry" from the era of elective care or "wants-based dentistry" requires that today's Dentist integrate innovative procedures with increased rapidity and predictability into their armamentarium. This program will address the following issues:

Learning Objectives:

Techniques

- Accelerated crown preparation
- Innovative porcelain veneer techniques
- Predictable bonding with today's new products
- Rapid esthetic temporization
- Simple esthetic soft tissue procedures for your generalist's practice
- Illusions of reality with "ovate pontics"
- Easy solving of esthetic dilemmas
- A simplified incisionless implant technique
- Bleaching—Practice maintenance!

New Products and Systems

- New ceramic systems—Procera, Emax, Lava. Problems and solutions
- Predictable bonding every time
- Creative crown systems — CAD cam / ceramometal?
- One-stage implants
- The new diamond burs
- Porcelain veneers by the numbers
- Composite solutions in 2010

This program will introduce you to new products and techniques that have already proven to be most effective in practice and will show you just **what to use, where to use it, and when**. It will address our need to meet the ever evolving public demand for **immediate dentistry** by integrating innovative restorative systems with implants and simplified basic periodontal procedures. It will update the generalist and specialist alike on state-of-the-art techniques and materials in restorative dentistry, esthetics, bonding, cosmetic and essential implants. This presentation includes a multi-media approach using computer simulation and video, which is designed for the **whole dental team including Dental Technicians.**

Saturday Speaker's

Dr. Kevin E. Lung, BSc, DDS, MSc

Topic: ***"Implants: The Good, the Bad and the Ugly"***

Synopsis: Since the serendipitous discovery of Osseointegration, we as dental practitioners have been able to improve the quality of life for so many suffering and debilitated patients. The dental implant has been a vital and extremely successful treatment option in the reconstruction of these compromised masticatory systems. This modality has provided the dental profession with the technology to address many difficult challenges in both edentulous spaces and deformities. The majority of the patient outcomes, utilizing this technology, have provided patients with impressive esthetic and functional dental prosthetic treatment. These satisfying outcomes can only occur if the practitioner maintains the highest levels of understanding of the applications and the limitations of dental implants.

Dr. Glen H. Johnson, DDS, MS

Topic: ***"New Dental Cements and Adhesives - What Can You Use and When?"***

Synopsis: New products for dental bonding involving fewer steps are available. What does the evidence show? The various bonding systems will be discussed and recommendations will be given. There are a host of new luting agents on the market. What does the evidence show for selection and use of these cements and how does their crown retention compare to established luting agents? What cements can you use successfully with high-strength zirconium oxide crowns? How should one treat the internal surface of the zirconia crown for a most effective cementation? These topics will be addressed based on evidence from recent studies.

Dr. Robert Miller, DDS

Topic: ***"Laser Surgery: Re-Engineering the Biologic Response"***

Synopsis: Traditional resective surgical techniques may have unintended or undesirable effects on soft and hard tissue. As concepts move towards minimally invasive therapy, ablative laser techniques may have significant advantages over older resective procedures. Previous generations of dental lasers operate in vaporization mode. The high operating temperatures of these lasers results in charring of tissue and may alter the surface of dental implants. Erbium based lasers, using a photoacoustic process, may be used to sculpt soft tissue, contour bone and teeth, and treat the surface of implants to enhance healing and provide a more ideal tissue envelope for implant aesthetics. This new generation of lasers holds the promise of replacing much of the hand and rotary instrumentation currently used in surgery.

Mr. Naoki Aiba, CDT, Oral Design

Topic: ***"DENTSCAPE: Dental Photography for Dentist-Laboratory Communications"***

Synopsis: Dental photography provides a means for bridging the gap between the patient and the technician. This lecture will discuss the method of overcoming three major esthetic challenges faced by the dental technician: shade matching, midline orientation and incisal edge position. An award-winning professional photographer and ceramist, Naoki Aiba will explain how he overcomes those challenges utilizing digital photography. He presents the fundamentals of dental photography, then addresses its practical uses in dentist-laboratory communication. In the latter half of the lecture, he will illustrate those applications in daily practice using clinical cases fabricated solely with photographic information, without seeing the patients. He will also discuss porcelain build-up and comment on the concepts of Transition Powder Technique™, Translucent Dentine Powder Technique™, Internal Staining Technique, as well as Pre-margin Correction Technique™ to improve marginal fit.

14 CE credits to be issued for Friday & Saturday

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14 au 16 octobre, Calgary, Alberta

Thème du congrès: La dentisterie pragmatique: aujourd'hui et au-delà

Conférencier notoire du vendredi

Dr. David Gaber, DMD

Dr. David Garber est membre d'un groupe d'éducateurs multidisciplinaires reconnus internationalement sous l'appellation Team Atlanta. Il est récipiendaire de: 2005 Gordon J. Christensen Lecturer Recognition Award, American College of Prosthodontics Distinguished Lecturer Award, Northeastern Periodontal Society Isador Hirschfeld Award for Clinical Excellence, Greater New York Academy of Prosthodontics Distinguished Lecturer Award, et David Serson Medal of Research. Il fut Président du American Academy of Esthetic Dentistry et siégea au Conseil d'administration de celui-ci ainsi que American Academy of Fixed Prosthodontics.

Dr. Garber oeuvre comme clinicien et professeur dans les départements de Parodontie et de Réhabilitation buccale au Medical College of Georgia, dans le département de Prosthodontie à Louisiana State University et dans le département de Dentisterie restauratrice de University of Texas à San Antonio. Il fut rédacteur du Journal of Esthetic Dentistry et co-auteur de Porcelain Laminate Veneers, Bleaching Teeth, Porcelain and Composite Inlays and Onlays, et Complete Dental Bleaching, et a publié plus de 60 articles et chapitres de manuels.

La dentisterie réalisable: 2010 et au-delà

Synopsis: ***La dentisterie réalisable 2010: Choix, options et alternatives***

Le monde dentaire évolue et se manifeste par des techniques cliniques novatrices jumelées à des nouvelles gammes de produits qui exigent que le praticien s'arme de procédures rapides et prévisibles. Ce programme touchera les sujets suivants:

Objectifs

Les techniques

- Préparation accélérée des couronnes
- Techniques novatrices pour facettes de procelaine
- Adhésion prévisible utilisant les produits actuels
- Temporisation esthétique rapide
- Exécution esthétique simple pour les tissus mous en pratique générale
- Réalisme des pontics ovoïdes
- Solutions faciles aux dilemmes esthétiques
- Un implant «sans incision» simplifié pour l'omnipraticien
- Blanchiment – maintien de la pratique

Les nouveaux produits et systèmes

- Nouveaux systèmes de céramique: Procera, Emax, Lava - problèmes et solutions
- Adhésion prévisible à chaque fois
- Systèmes créatifs de couronnes: CAO/FAO/céramométalliques
- Implants en un seul stade
- Les nouvelles fraises diamant
- Facettes de porcelainé
- Solutions avec composites en 2010

Ce programme vous introduira aux nouveaux produits et techniques déjà éprouvés et fera la démonstration de **quoi, où et quand les employer**. Il discutera du besoin du public pour la **dentisterie immédiate** et intègrera les nouveaux systèmes de restauration avec les implants et des procédures parodontales simplifiées. Il fera une mise-à-jour des techniques et matériaux de fine pointe en dentisterie restauratrice, esthétique, adhésive, implantaire cosmétique et essentielle. Une approche multi-média faisant usage de simulation informatisée et de vidéo s'adressera à **l'équipe dentaire intégrale incluant hygiénistes, assistants et personnel de laboratoire.**

Conférenciers du samedi

Dr Kevin E. Lung, BSc, DDS, MSc

Les implants: Le Bon, La Brute, Le Truand

Synopsis: Depuis la chanceuse découverte de l'Osséointégration, nous avons, en tant que praticiens dentaires, été capables d'améliorer la qualité de vie de tellement de patients. L'implant dentaire a contribué de façon vitale à la réhabilitation buccale de ces systèmes masticatoires, compromis soit par les espaces édentés ou les diformités. La majorité des résultats de cette technologie se sont avérés des réussites éloquentes en rétablissant fonction et esthétique suite aux traitments prothétiques. Or, la compréhension profonde des applications et limites de l'implant dentaire est le seul gage de succès du praticien.

Dr. Glen H. Johnson, DDS, MS

Les nouveaux ciments et adhésifs: Lesquels utiliser et quand?

Synopsis: Des nouveaux produits adhésifs impliquant moins d'étapes sont maintenant disponibles. Divers systèmes d'adhésion seront discutés et certains recommandés. Il y a une multitude d'agents liants sur le marché. Que nous démontre les données pour le choix et l'utilisation de ces ciments et comment se comparent-ils aux produits conventionnels du point de vue rétention de la couronne? Quels ciments sont les plus compatibles avec les couronnes d'oxyde de zircon? Comment doit-on traiter la surface interne de la couronne en zircon afin d'obtenir la cimentation la plus efficace? Ces sujets seront présentés basés sur les données d'études récentes.

Dr. Robert Miller, DDS

La chirurgie au laser: Ré-ingénirie de la réaction biologique

Synopsis: Les techniques traditionnelles de chirurgie résective peuvent causer des effets indésirables sur les tissus mous ou durs. Étant donné la tendance vers des thérapies moins envahissantes, l'ablation par laser pourrait avoir des avantages significatifs par rapport aux interventions usuelles. Les générations précédentes de lasers dentaires fonctionnent en mode vaporisation. Leur température élevée carbonise les tissus et peut modifier la surface des implants dentaires. Les lasers à l'erbium, utilisant un procédé photoacoustique, peuvent être employés pour sculpter les tissus mous, recontourner l'os et les dents, et traiter la surface des implants dans le but d'améliorer la guérison et de procurer une meilleure esthétique de l'enveloppe tissulaire. Cette nouvelle génération de lasers remplacera sans doute la plupart des instruments rotatifs présentement sur le marché.

Mr. Naoki Aiba, CDT, Design Oral

La photographie dentaire pour les communications dentistes-laboratoires

Synopsis: La photographie dentaire accorde un moyen de rapprocher le patient et le technicien. Cette présentation discutera des moyens de surmonter trois défis esthétiques importants auxquels fait face le technicien dentaire, à savoir: La sélection des teintes, l'orientation de la ligne médiane et le positionnement des rebords incisifs. Céramiste et photographe professionnel qui s'est mérité plusieurs prix, Naoki Aiba expliquera comment il maîtrise ces problèmes avec la photographie digitale. Il introduira les fondements de la photographie dentaire pour ensuite discuter de son utilisation dans la communication dentiste-laboratoire. Dans la seconde partie de son discours il fera la démonstation de ces applications dans la pratique courante pour les cas cliniques fabriqués uniquement de l'information photographique, sans voir les patients. Il parlera aussi des ajouts de porcelaine et commentera les concepts de Transition Powder Technique™, Translucent Dentine Powder Technique™, la technique de coloration interne, ainsi que Pre-margin Correction Technique™ pour améliorer l'adaptation marginale.

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Potential Comprehensive Role for Highly Concentrated Platelet Rich Plasma (hcPRP) in Bone Regeneration: Criteria for Successful Bone Grafting and Advantages of Grafting with hcPRP

Astley E. Smith, MSc, DMD

ABSTRACT

Highly concentrated platelet rich plasma (hcPRP) is a new terminology, defined as platelet concentrate greater than eight times the baseline of platelets in whole blood. The positive that comes from hcPRP is that transforming growth factor beta (TGF-β) has immunosuppressive, anti-rejection, anti-inflammatory, pro-tolerant, and pro-healing properties. Therefore, this molecule is probably responsible for controlling negative immune responses when xenografts and allografts are used for oral grafting. This article discusses the idea that it might be prudent to mix allografts and xenografts with hcPRP. The article also presents criteria for successful bone grafting with hcPRP and advantages of grafting with hcPRP.

RÉSUMÉ

Le plasma riche en plaquettes hautement concentré est une nouvelle terminologie et se définit comme étant huit fois plus concentré que les plaquettes du sang entier. De ce concentré plaquettaire, on obtient le facteur de croissance transformant bêta (TGF-β) qui a des propriétés immunosuppressives, anti-rejet, anti-inflammatoires, pro-tolérantes et pro-cicatrisantes. Par conséquent, cette molécule est probablement responsable de contrôler les réponses immunitaires négatives lorsque les xénogreffes et les allogreffes sont utilisées. Cet article traite de l'idée qu'il peut être prudent de mélanger les allogreffes et les xénogreffes avec le plasma riche en plaquettes. Il aborde également les critères nécessaires à la réussite d'une greffe osseuse avec le plasma riche en plaquettes et ses avantages.

About the Author

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Highly concentrated platelet rich plasma (hcPRP) is a new terminology, defined as platelet concentrate greater than eight times the baseline of platelets in whole blood. PRP$^{23\times}$ represents platelet concentrate at 23 times baseline. During the past 16 years some researchers defined platelet rich plasma as platelet concentrate with at least 1,000,000/µL.[1] Normal platelet concentration baseline, which varies with individuals, is within the range of 150,000/µL to 450,000/µL.[2] Since patients may respond physiologically according to his or her own platelet baseline, we are now provided with another method to define and compare platelet concentration.

Accurate counting of platelets has presented some difficulty in the past,[3] but at the Centre for Blood Research at the University of British Columbia, the Bayer ADVIA 120 Hematology Analyzer[4] counted platelets accurately up to 5 million/µL with or without dilution.[5]

Since the early 1990s platelet rich plasma (PRP) at 2–8× baseline has been used in implant dentistry for the enhancement and acceleration of bone regeneration when mixed with xenografts, allografts, autogenous bone, and alloplasts.[6–10]

In my research during the past five years I have been able to produce platelet concentrates from 9–90× baseline (Figure 1). In these procedures, the platelets are exposed to a range of 10,200 to 14,200 g-minutes of centrifugation (Figure 2). The threshold for lysis of platelet membrane is 30,000 g-minutes.[1] These concentrates are activated with autologous thrombin in the serum extracted from the patient's own blood. Clinical applications have revealed that all concentrates ≥15× baseline will rapidly regenerate 100% vital new bone without the addition of bone or bone substitute while still providing the usual positive working and physiological characteristics of regular PRP at 2–8× baseline. The grafted bone using PRP$^{23\times}$ and collagen sponge as a scaffold/carrier induced D3 bone in the maxillary sinus floor within 5 months and accommodated the placement of two endosseous implants which have been restored and are in function. At these very high concentrations of platelets all growth factors are concentrated, giving greater enhancement to the regeneration of vital new bone in an oral surgical site. In 3 months, different concentrations of platelets produced different densities in the bone regenerated when compared in sockets on both sides of the same patient's mandible. This revealed that the development of bone density was dose dependent on hcPRP (Figure 3). The varying concentrations of hcPRP may probably have varying regenerative potential in different anatomical sites of the human skeleton.

The procedure for developing hcPRP requires a centrifuge with variable speed and a fixed angled internal attachment which can accommodate 10 mL vacutainer tubes. A custom-ordered blood collection kit is also necessary along with a tray and kit for presentation of the processed hcPRP to the surgeon in the surgical operatory. Proper training for the production, activation, and clinical applications of the various concentrations of hcPRP is mandatory to achieve the best result.

Morcelized resorbable collagen sponge (MRCS), fibrin, bone, and bone substitutes are used as carriers of PRP$^{23\times}$ into the various surgical sites. When one carrier MRCS was used with allograft and PRP$^{23\times}$, the regeneration of vital new bone was approximately 16% higher compared with no carrier with the same allograft over the same period of time. So far clinical results reveal that when two carriers (collagen + alloplast) were used the regeneration of vital new bone was approximately 25% higher than when one carrier (collagen) was used. When five cases of allograft mixed with PRP$^{23\times}$ were compared with five cases of PRP$^{23\times}$ alone with no added bone or bone substitutes the PRP$^{23\times}$ cases regenerated 16% more vital new bone over the allograft cases during an average period of 6 months. The allograft had to be resorbed while no resorption was required with PRP$^{23\times}$ alone.

The study of immunology reveals that allografts and xenografts can sometimes be rejected by the human body under the

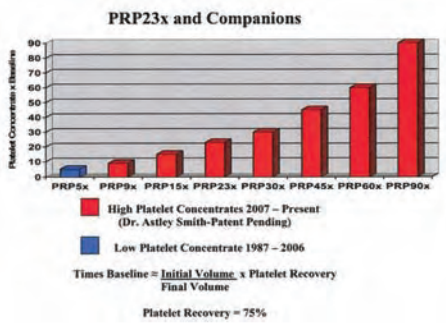

Figure 1. Production of highly concentrated platelet-rich plasma (hcPRP). hcPRP = platelet concentrate > 8× baseline.

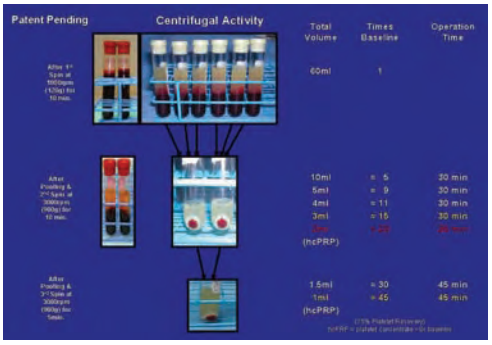

Figure 2. Six-tube model with strategic pooling and triple spin.

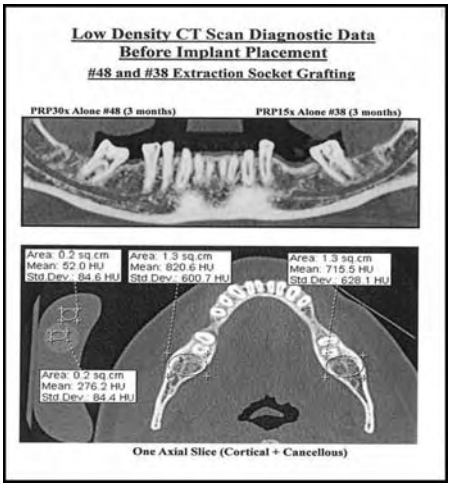

Figure 3: Comparison of corticocancellous bone density in right and left mandibular molar sockets at 3 months using two different hcPRP concentrations

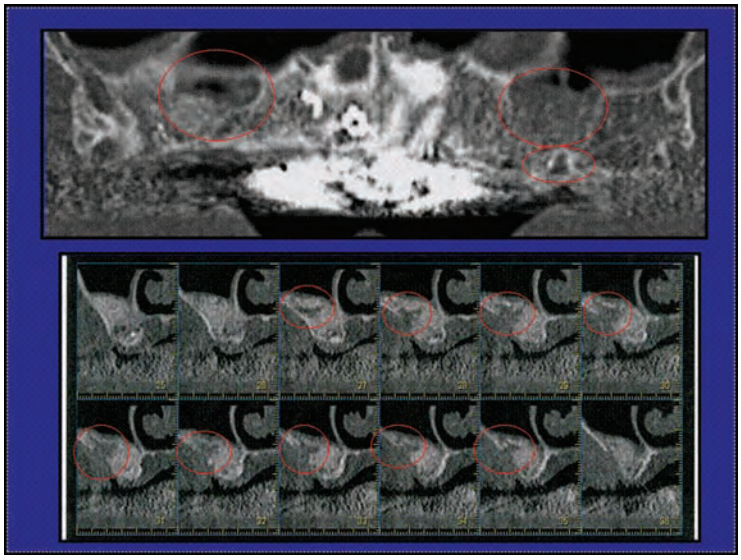

Figure 4. Osteolysis of allograft in the right sinus (hcPRP graft in left sinus was unaffected).

heading of delayed type hypersensitivity (type IV), a cell-mediated acquired immune response accompanied by not only destruction of the grafted bone material but also of the host bone suffering collateral damage. This phenomenon occurs when the immune response controls the antigen but does not destroy it and a granuloma develops to wall off the invading antigen embedded in the phagosomes of macrophages.[11–14] Most cases are self-limiting and the body gains control, but it can be life threatening if the patient is immunodeficient.[15] Oral candidiasis is a marker of mild immunodeficiency, and it is often the first opportunistic infection in patients with HIV and in other mild secondary immunodeficiencies such as those caused by extreme age and immunosuppressive drugs.

This type of negative immune response may go unnoticed by the surgeon but is probably responsible for some bone grafting and implant failures since symptoms appear at the end of the time taken for antigens to be transported to the lymph nodes, T-lymphocytes cloned and activated, and then returned to the site of antigen invasion. For the formation of a granuloma, the peak delayed response time is 21 to 28 days,[16] which is after the sutures have been removed and the post-surgical check has been done. Bone graft and host bone destruction are best shown by a computed tomography (CT) scan taken 3 months post-surgery. If bone destruction is taking place, implants should not be inserted.

The positive that comes from hcPRP is that transforming growth factor beta (TGF-β), which is exocytosed from activated platelets, is listed in the literature as a cytokine that is immunosuppressive, anti-rejection, anti-inflammatory, pro-tolerant, and pro-healing.[17–22] Therefore, this molecule is probably responsible for controlling negative immune responses when xenografts and allografts are used for oral grafting. My experience over 15 years of grafting has revealed 100% success rate when hcPRP is mixed with different grafting materials, but I have had two failures with a xenograft and an allograft when hcPRP was not involved. The delayed times for the symptoms of the immune reactions were 27 days for the xenograft and 30 days for the allograft (Figure 4).

The sample of two failures is too small to draw a statistical conclusion, but it is hoped that this will alert surgeons to the possibility and probability of negative immune reactions when using xenografts and allografts without hcPRP. Both cases with the negative immune responses were treated with antibiotics and corticosteroid, and the body gained complete control of the symptoms and tissue destruction. In order to gain patient benefits from the natural immunosuppressive, anti-inflammatory, and pro-healing characteristics of TGF-β, it might be prudent to mix allografts and xenografts with hcPRP. Viable vital new bone can now be regenerated in any surgical site of the skeleton by using hcPRP with a scaffold/carrier. Based upon my research and clinical experience, I wish to submit some criteria for successful bone grafting with varying concentrations of hcPRP, as well as the advantages of grafting with hcPRP.

Criteria for Successful Bone Grafting with Various Concentrations of hcPRP

1. The trabecular bone struts should have connectivity.
2. The grafted bone should have a distribution of bone metabolic units.
3. The grafted bone should turnover and show signs of maturity (lamelar architecture) as it remodels.
4. The grafted bone should have normal bone density after three months with variations for different anatomic sites.
5. The grafted bone should not precipitate any negative immunological reactions.
6. The grafted bone should attach to the host bone by osteocoalescence.
7. The grafted bone should be denser than the host bone.
8. The grafted bone should display the absence of giant multinucleated inflammatory cells when analyzed histologically and histomorphometrically.
9. The bone grafting experience should demonstrate the absence of allergic reactions.

Advantages of Grafting with hcPRP

- The procedure is completely autologous
- It's free of disease transmission
- It's free of negative immune reactions
- It minimizes swelling and discomfort
- It is the only procedure in which hcPRP and autologous thrombin/platelet activating factor 4 (PAF4) are produced simultaneously from the patient's own blood
- It is the only procedure in which 6 mL of hcPRP can be produced at 15 times baseline

- hcPRP alone can produce D2 bone in 3 months in five-wall bony defects
- hcPRP alone will regenerate all mesengenic tissues in human skeletal joints
- Platelet activation is done by using autologous biomaterials
- This method of grafting has applications in dentistry, sports medicine, orthopedics, and other medical professions
- hcPRP may reduce recovery time for injured athletes

Conflicts

None declared.

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The Fully Edentulous Resorbed Maxilla: Surgical and Restorative Techniques to Avoid Bone Grafting

Yvan Fortin, DMD, Kenji W. Higuchi, DDS, MS, Richard M. Sullivan, DDS

About the Authors

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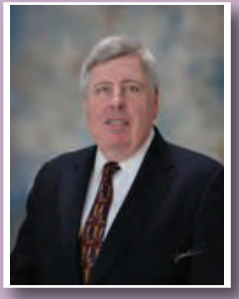


Richard M. Sullivan, is vice president of clinical technologies for Nobel Biocare and maintains a private practice with special emphasis of the fully edentulous patient in Yorba Linda, California. Dr. Sullivan is a fellow of the Academy of Osseointegration and completed the two-year Harvard University Seminars in Implant Dentistry program in 1988.

ABSTRACT

Increasing numbers of fully edentulous patients are turning to dental implantology to treat their condition. However, the trend in recent years by dental surgeons to propose bone grafts has considerably diminished the enthusiasm of patients for this type of treatment. Personal observation since 1992 has confirmed that implant restoration of the maxilla is possible and predictable without compromise with alternatives to bone grafts in the vast majority of patients, even with advanced resorption. This article is a brief summary of surgical and prosthetic options that help to avoid the use of bone-grafting procedures.

RÉSUMÉ

De plus en plus de patients complètement édentés se tournent vers les implants pour résoudre ce problème. Toutefois, au cours des dernières années, les chirurgiens dentaires avaient tendance à proposer des greffes osseuses, ce qui a diminué considérablement l'enthousiasme des patients pour ce type de traitement. Une observation personnelle depuis 1992 a confirmé que la restauration du maxillaire par la pose d'implants est possible et prévisible sans compromis avec des solutions de rechange aux greffes osseuses pour la grande majorité des patients, même s'il y a résorption avancée. Cet article est un bref résumé des options chirurgicales et prosthétiques permettant d'éviter les greffes osseuses.

Demographic information shows that the number of people missing all of their teeth in one or both arches will continue to increase for the next 10 years.[1] Increasing numbers of fully edentulous patients will be turning to dental implantology during this time to treat their condition. However, the trend in recent years by dental surgeons to propose bone grafts has considerably diminished the enthusiasm of patients for this type of treatment.

Already in 1985, Professor P-I Brånemark, with hundreds of fully edentulous patients treated, had stated that bone grafts in the fully edentulous maxilla would only be necessary in about 5–10% of patients.[2] Personal observation since 1992 has confirmed that implant restoration of the maxilla is possible and predictable without compromise with alternatives to bone grafts in the vast majority of patients, even with advanced resorption. The future appears very promising in terms of interesting new patients who would like to once again have teeth in their maxilla without the necessity of bone grafts.

This article is a brief summary of surgical and prosthetic options that help to avoid the use of bone-grafting procedures. Recognizing that each approach has been documented by itself, it is the combination of approaches that have served as a foundation for treatment planning to evaluate patient treatment with non-grafting methods. This article will describe the following four treatment options that have been utilized: short implants, tilted implants, molar-to-malar process trans-sinus implants, and the Marius CAD/CAM bridge, a fixed/detachable prosthesis design.

Short Implants

A literature review by Renouard and Nissand has shown conflicting results with short implants (7 to 9 mm length), with some studies showing increased loss, and others, using an adapted surgical technique and textured implant surfaces reporting the same results as longer implants.[3] A notable retrospective study by Brånemark and colleagues compared the outcomes of fully edentulous jaws over a 10 year period. In this analysis, the intention was to place six implants in all patients. However, due to anatomic limitations including decreased bone volume, sometimes only four implants could be placed; during this time period, only 7- and 10-mm long implants were available.

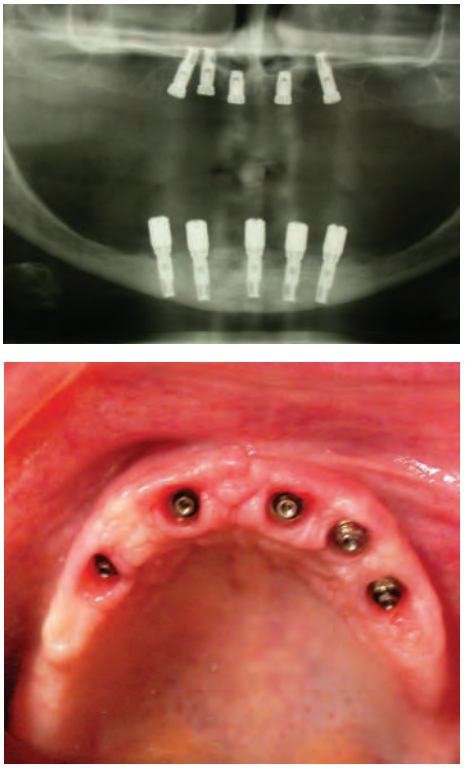


Figure 1. Seven millimetre implants in highly resorbed residual ridge crest in anterior maxilla. Note posterior support provided by tilted implants anterior to maxillary sinus wall.

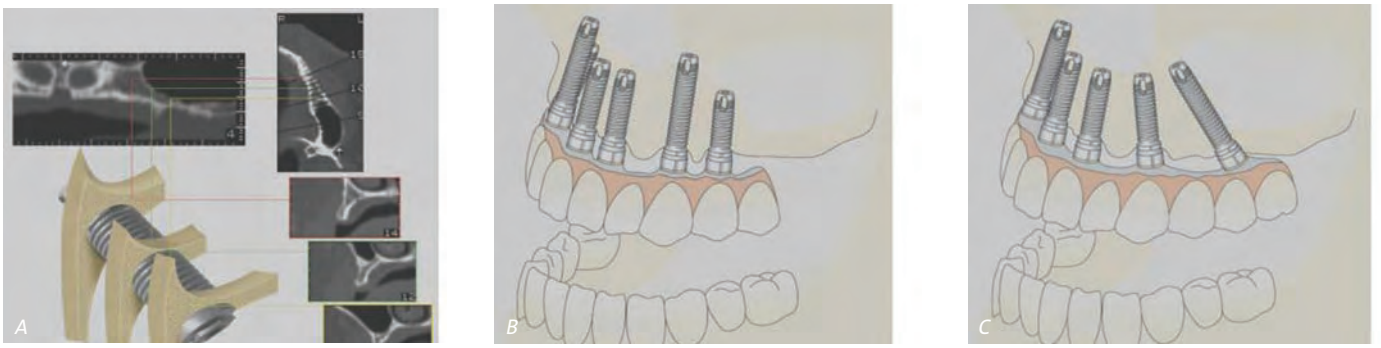


Figure 2. *A*, even with a thin maxillary ridge, the area anterior to the sinus is broad creating a three-dimensional pyramid of bone; *B*, traditional approach of straight implants. *C*, illustration of tilted implant showing additional length of posterior support with one additional tooth and reduced cantilever length.

Their finding for both jaws was that prosthesis survival and implant survival was the same for full arch fixed implant restorations.[4] Personal experience over a period of 18 years with the high quality bone observed in the anterior portion of the maxilla of most patients with moderate to severe resorption has confirmed these results. (Figure 1).

Tilted Implants

Tilted implants began being evaluated as a sinus graft alternative by the author in 1992, with 5 year results of the first 45 patients treated published in 2002. The data presented showed no difference in implant survival with tilted implants in the posterior maxilla compared to straight implants within the same patient.[5] These findings have been confirmed by other authors.[6–9] Tilted implants are indicated in the posterior maxilla when there is insufficient bone in the molar area, but implants are able to be inclined following the anterior wall of the maxillary sinus in the premolar area. There are many patient benefits associated with the use of tilted implants.

The first advantage is that the anatomy of the maxilla of most patients makes it possible to install implants that engage the three cortices – palate, buccal plate, and anterior wall of the sinus – in a three-dimensional pyramidal zone along the anterior wall of the sinus. (Figures 2 and 3) This permits placement of a longer implant with greater initial stability. While not appropriate for single tooth restoration, there have been no biochemical complications associated with tilted implants when joined with a rigid framework to other implants in a full arch distribution.

The second advantage is that there is a better arch form distribution of anchorage resulting in a better anterior/posterior spread without sinus grafts. This minimizes cantilever extension while providing posterior structural support of masticatory forces. (Figure 4 A–D).

Molar-to-Malar Process Trans-sinus Implants

Zygomatic implants were originally developed by Per-Ingvar Brånemark as a method of fixation for the severely resorbed maxilla.[10] Zygomatic implants have been used for over 15 years, and are indicated when there is no bone in either posterior molar or premolar positions.[11] The implant survival rates supported by Brånemark and others are similar to other implants and have few complications.[12–14] Despite this history and documentation, zygomatic implants have never been very popular in the field of implantology, mainly because of the compromises in terms of phonetics, hygiene, and comfort where these implants protrude in the palate and because of the relatively extensive surgery required (Figure 5).

To be able to utilize the potential of the zygomatic implant without the phonetic and esthetic compromises, a new approach has been developed which we refer to as the "molar/malar implant." *Malar process* is an older term for the *zygomatic process*, used here as a play on words to describe a differentiated insertion path used with zygomatic implants to achieve favourable prosthetic results for alignment at or near the residual ridge crest. This technique utilizes a zygomatic implant inserted just palatal to the

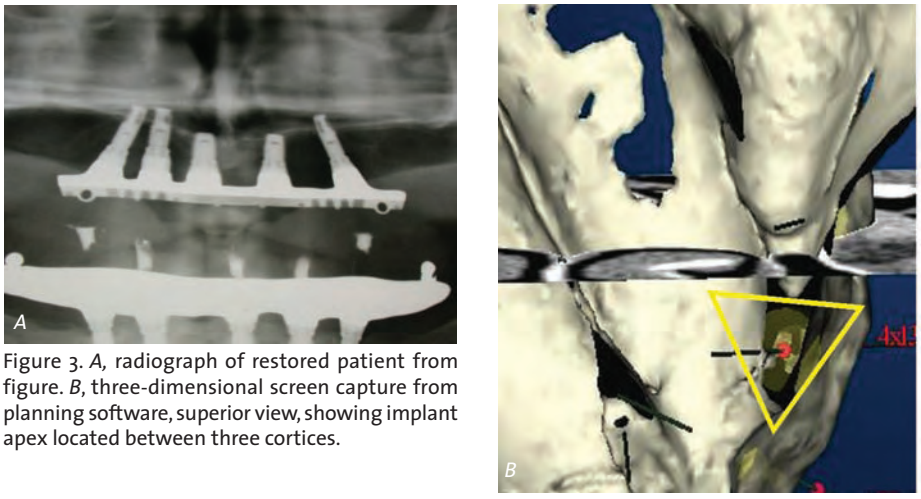


Figure 3. *A*, radiograph of restored patient from figure. *B*, three-dimensional screen capture from planning software, superior view, showing implant apex located between three cortices.

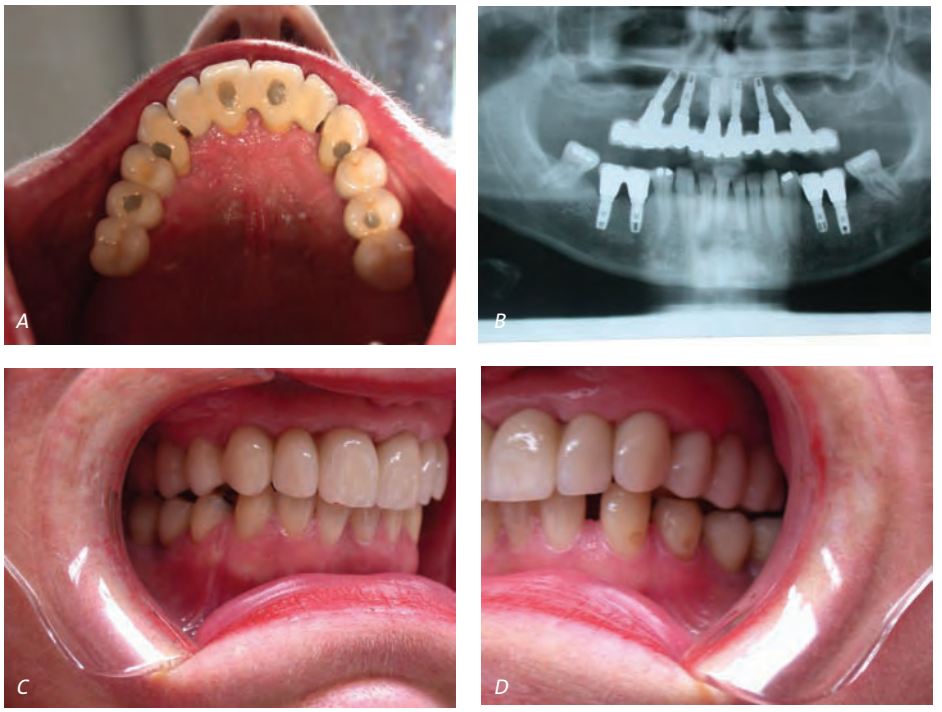


Figure 4 *A–D*. Patient restored in 1994 with tilted implants and full arch splinted ceramo-metal restoration. Note appropriate contours of restoration and limited cantilever length with pneumatized sinus achieved without bone grafts.

residual alveolar ridge in the first molar area with apical fixation in the malar process (zygomatic process). This is a development of the original technique which anchored the zygomatic implant apex in the main body of the zygoma. The results of approximately 300 zygomatic implants placed with this technique over the past 8 years have demonstrated the possibility to have restorative alignment comparable to a traditional implant relative to the ridge crest. Besides the improvement of implant alignment for a restoration without compromise, the technique is also more minimally invasive than the original protocol. This is due not only to less manipulation of the sinus membrane to reduce the incidence of perforation, but also being able to safely place the apical aspect of the implant without direct visualization utilizing a variation of the sinus slot technique[15,16] (Figures 6 and 7).

The Marius CAD-CAM Bridge: A Fixed-Detachable Prosthesis Design

The possibility of performing rehabilitations that meet the expectations of our moderately to severely edentulous patients, i.e., a fixed rehabilitation that has no compromises in terms of phonetics, hygiene, comfort, esthetics, and lip support, is a major plus for implant treatment of the fully edentulous maxilla.

A removable, fixed bridge is the only tool that allows us to deal with all these factors in patients with moderate to severe resorption due to deficiencies of bone structure and the effects on patient facial and lip support.

The Marius Bridge is a double structure, removable fixed bridge that provides all the benefits listed above.[5] The CAD-CAM structure provides a highly precise connection between the bridge, which the patient can remove, and the structure that is screwed into his or her mouth. It eliminates the useless palatal extension commonly associated with maxillary overdentures, and makes it possible to reproduce the patient's lip support with no compromises in terms of hygiene and phonetics. It is held in place by combination of an undercut angle in the bar design and a secure posterior lock[17] (Figure 8).

Conclusion

Based on over 1,000 patients with a completely edentulous maxilla treated over an 18-year period, we can affirm that we can treat most patients using the method that we deem is the best suited for the needs of each patient, i.e., a zirconia-to-porcelain fixed bridge, a profile titanium-acrylic bridge,[18,19] or a Marius CAD-CAM removable fixed bridge.

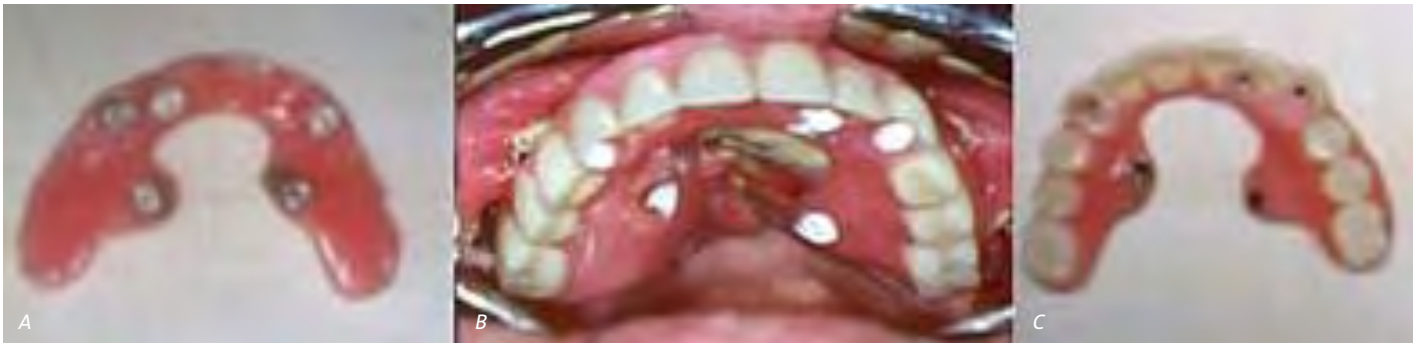


Figure 5 *A–C*. Representative results of early zygomatic implant protocol with palatal extensions of prosthesis.

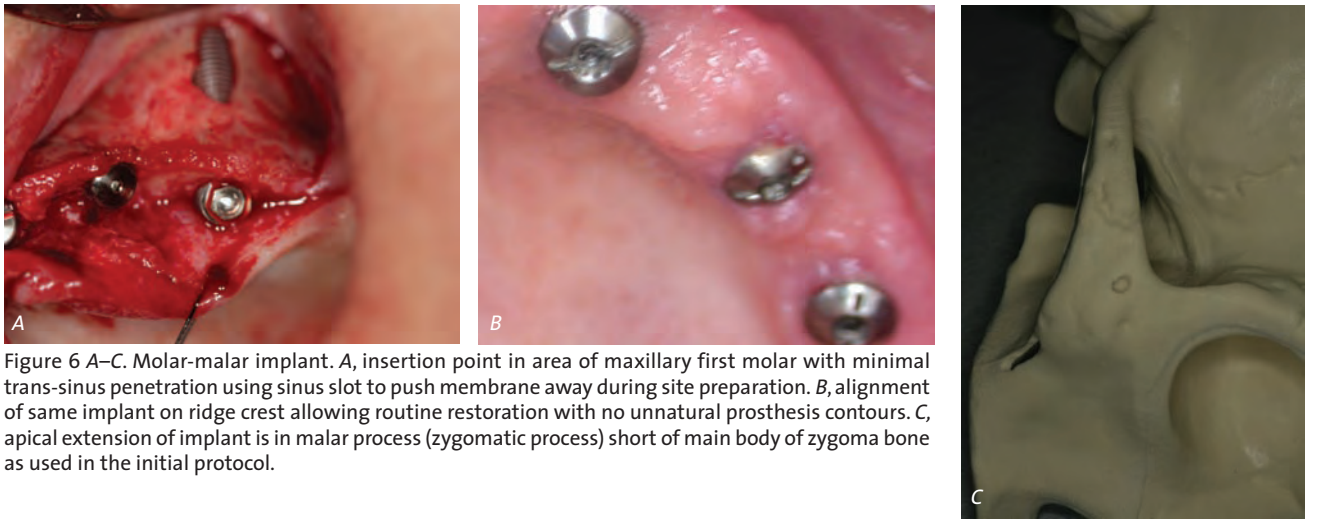
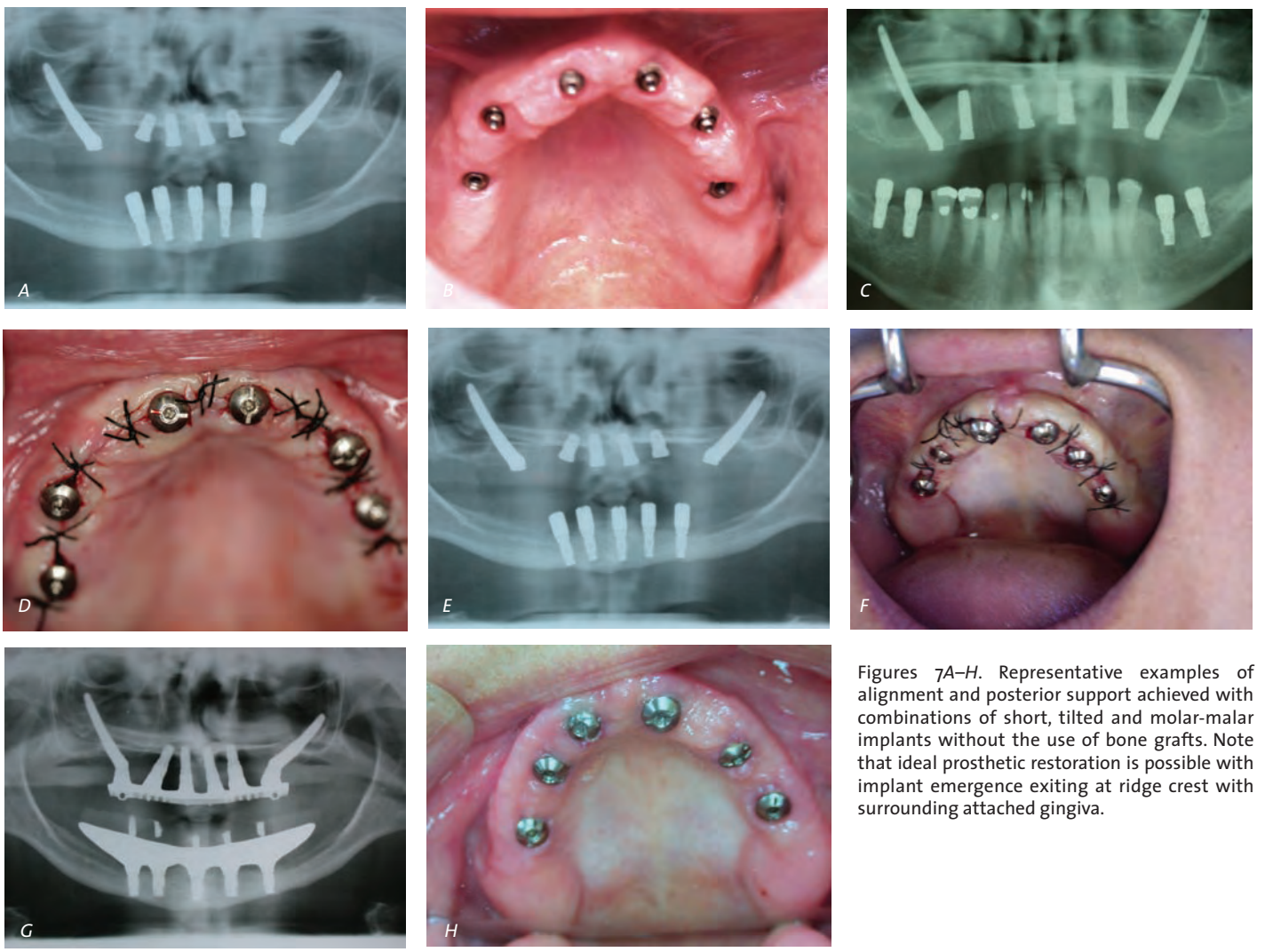


Figure 6 *A–C*. Molar-malar implant. *A*, insertion point in area of maxillary first molar with minimal trans-sinus penetration using sinus slot to push membrane away during site preparation. *B*, alignment of same implant on ridge crest allowing routine restoration with no unnatural prosthesis contours. *C*, apical extension of implant is in malar process (zygomatic process) short of main body of zygoma bone as used in the initial protocol.



Figures *7A–H*. Representative examples of alignment and posterior support achieved with combinations of short, tilted and molar-malar implants without the use of bone grafts. Note that ideal prosthetic restoration is possible with implant emergence exiting at ridge crest with surrounding attached gingiva.

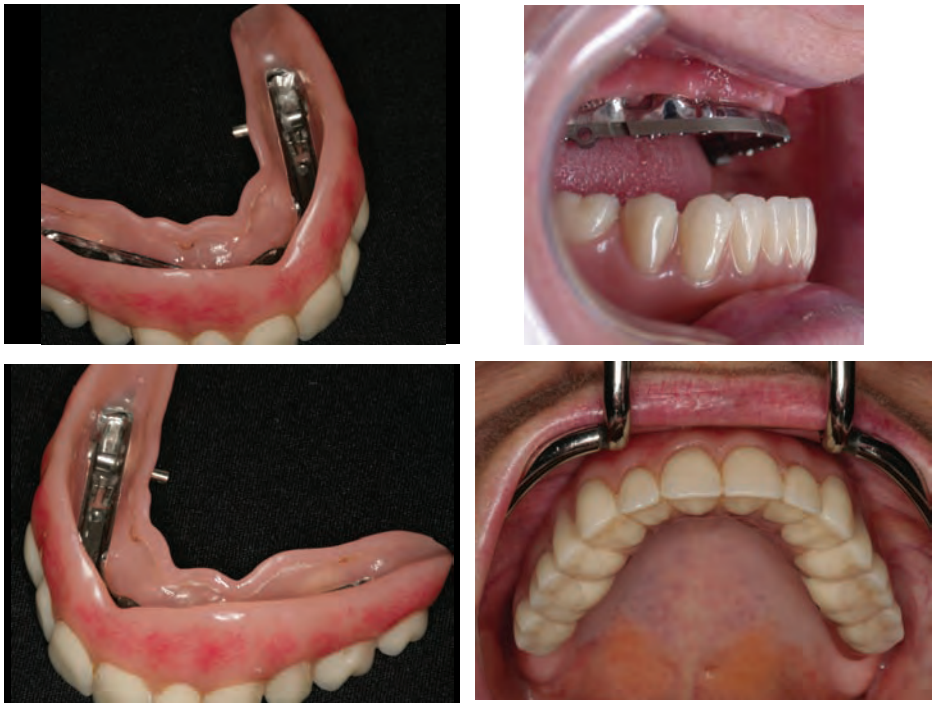


Figure 8. Marius CAD/CAM bridge with patient removable suprastructure offering hygiene access with stable non-resilient flanged restoration. Note open palate without extensions as typical on overdenture restorations.

We can also assert that we can treat 98% of patients using tilted implants, short implants positioned in good quality bone in the anterior portion of the upper maxilla, or zygomatic implants (molars-malar) without resorting to bone grafts. The exit points of all these implants are on the top of the crest and are surrounded by attached gingival tissue. The choice of the most appropriate prosthetic solution for each patient, among those mentioned above, should provide a result with no compromises in terms of phonetics, comfort, esthetics, or hygiene.

Conflicts

None declared.

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Nanotextured Implant Surfaces: Re-engineering the Bone Response

Robert J. Miller, MA, DDS, FACD, DABOI

ABSTRACT

Changes in the microtopography of implant surfaces to increase roughness has been shown to increase to speed of osseointegration and percentage of bone-to-implant contact. Bone cell adhesion and metabolism can be further enhanced through the use of nanotextured surface and calcium phosphate impregnation. Reduction of the catabolic phase of bone leads to earlier bone bonding. Our ability to re-engineer the bone response may lead to earlier loading and more predictable outcomes in implant dentistry.

RÉSUMÉ

Il a été démontré que les changements dans la microtopographie des surfaces implantaires pour augmenter la rugosité augmentaient la vitesse d'ostéointégration et le pourcentage du contact du matériau implanté et de l'os. L'adhésion de cellules osseuses et le métabolisme peuvent être améliorés par l'utilisation d'une surface nanostructurée et par imprégnation au phosphate de calcium. La réduction de la phase catabolique de l'os entraîne une liaison osseuse précoce. Notre capacité à redéfinir la réponse osseuse peut mener à la mise en charge précoce et à des résultats plus prévisibles en implantologie.

About the Author

Dr. Miller received his BA from New York University and M.A. from Hofstra University, both in biology. He graduated with honours from New York University College of Dentistry where he received the International College of Dentists Award for clinical excellence. Following graduation, he completed a residency program at Flushing Hospital and Medical Center where he was involved in all phases of dentistry including facial trauma. Dr. Miller is a board certified diplomate of the American Board of Oral Implantology/Implant Dentistry and a fellow of the American College of Dentists.

Dr. Miller is chairman of the Department of Oral Implantology at the Atlantic Coast Dental Research Clinic in Palm Beach, Florida. He has lectured internationally on all phases of oral implantology and laser surgery and is director of The Center for Advanced Aesthetic and Implant Dentistry in Delray Beach, Florida.

Interaction between an artificial device and living tissue is a fascinating field of exploration and science. In the last 30 years, we have observed an ever-increasing convergence of diverse branches of science. Today, specialists can no longer rest on what was learned from the pioneers of their discipline. Cross-disciplinary education and perusal of the scientific literature is a "must" for the contemporary practitioner. Thus, a periodontist must have a basic understanding of advanced immunology, the immunologist must understand advanced biochemistry, and the biochemist needs to remain updated in advanced physics and mathematics. In addition, all can benefit from a good dose of philosophy, which is indispensible for gaining a perspective in a time of rapidly changing technology and for the conceptualization of complex theories.

With respect to the interactions between an implant and its surrounding tissues, the work of Professor Per Ingvar Branemark clearly established the basics of "osseointegration" and demonstrated that bone may heal uneventfully when placed in contact with titanium. But that was only a beginning. Too many questions were left unanswered; why do we continue to experience implant failures, usually at early stage of bone repair? Do all the implant designs trigger the same response from bone? Is bone healing always the same, regardless of thread design, surface characteristics, load or no-load, or degree of approximation to the implant?

If we consider the multitude of endosseous implant designs on the market, with different surface finishes, we are faced with the paucity of studies to validate the merits of those refinements. Instead, we are bombarded by advertising claims, numerous anecdotal and clinical case reports, literature published by universities that rely on multi-million dollar research grants, and, only recently, some biologically driven implant designs.

An example of addressing the biologic imperative can be seen in the work of Berglundh, et al. This report demonstrates that changing thread design and drilling sequence could significantly alter the kinetics of bone healing.[1] Coelho, et al, also provided evidence that a thread design change, combined with a change in drilling sequence would speed up bone formation by a factor *as great as 10 times*.[2] The data are impressive, and even more impressive when you consider the fact that these experiments were still looking at a macro scale where we can visualize the changes that were made to the implant architecture by the naked eye.

The history of surface modifications has also undergone its share of trial and error, progressing from machined surfaces, to titanium plasma spray (TPS), acid etched, and plasma spray hydroxyapatite. Thankfully, a consensus has emerged from the scientific community with respect to this characteristic, and the verdict has come in: *micro-rough* surfaces are superior when direct bone apposition is desired. Despite the fact that the technologies employed to generate these surfaces may vary from one manufacturer to another, the same profile and surface chemistry will provide the same biological response. An important difference to note in this advance is that whereas the changes in thread design and drilling sequences are discernible by the human eye, the perception of significant surface changes can only be determined via microscopic examination. Kikuchi, et al, have shown that the surface characteristics that exist at this level are essential for platelet activation.[3] They have concluded that the surface characteristic present at the level where measurement by surface profilometry is required is *more* important than gross surface chemistry. At this level of technology, the changes are on the micro scale.

Most implant manufacturers have remained focused on the micro level even though many use the "buzz-word" of nanotechnology. Nanotechnology is a relatively new science (less than 30 years old) and its development increased exponentially in the nineties with the introduction of the scanning tunneling microscope and the atomic force microscope. The discipline encompasses various areas: nanomaterials and molecular nanotechnology. Molecular nanotechnology consists of creating complex structures, using the atoms as elemental building blocks. Nanoprofilometry is often confused with the term nanotechnology, but they are not synonymous. They are as different as "looking" versus "doing."

OSSEAN Surface Treatment

Surgical principles in oral implantology are returning to a paradigm of early or immediate loading of dental implants. Therefore, respect for both prosthetic and biologic principles is imperative. When a dental implant is placed, the bone to implant interface is weaker at two weeks immediately after implant insertion because of an inflammatory cascade and catabolic events which result in bone breakdown and remodeling.[4] This places the implant at risk if it is placed in immediate function or in an extraction site with a significant defect. Previous implant coatings, such as plasma-sprayed hydroxyapatite (HA), have attempted to address this breakdown phase with demonstrable success.[5] Earlier amorphous HA coatings were highly osteoinductive because of the bioavailability of free calcium ions and the effect on osteogenic cells.[6] Studies of HA coated implants in the 1980s clearly demonstrated earlier osseointegration and a higher bone-to-implant contact.[7] However, the low crystallinity of HA led to fractures of these coatings and severe peri-implant infections after cyclical loading.[8] For over a decade, many clinicians have avoided HA coatings as a result of these complications. In an attempt to eliminate these clinical problems, manufacturers subsequently changed the HA formulation to approximately 97% crystallinity. This solved the fracture problem but had the opposite effect on osteoinductivity. Highly dense HA does not resorb to any significant degree. This dramatically reduces the bioavailability of free calcium from the implant surface. Therefore, current HA surfaces have limited biologic interaction when compared to newer acid-etched titanium surfaces and no longer offer any significant clinical advantage.[9]

In 1991, the concept of "bone-bonding" was first described.[10] Different from the type of interface originally described by Branemark and known as osseointegration, bone-bonding is characterized as an interfacial bond between the bone and implant surface that exceeds the cohesive strength of either bone or implant.[11] A chemical interaction occurs between bone and implant that enhances both bone crystallinity and

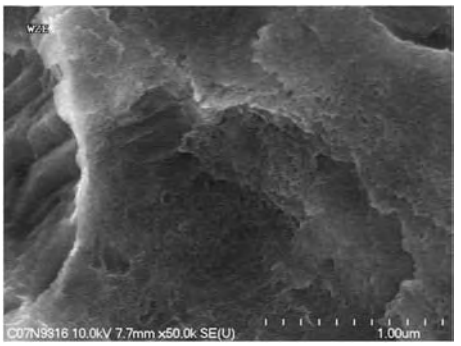

Figure 1. SEM of Ossean surface at 50,000× magnification

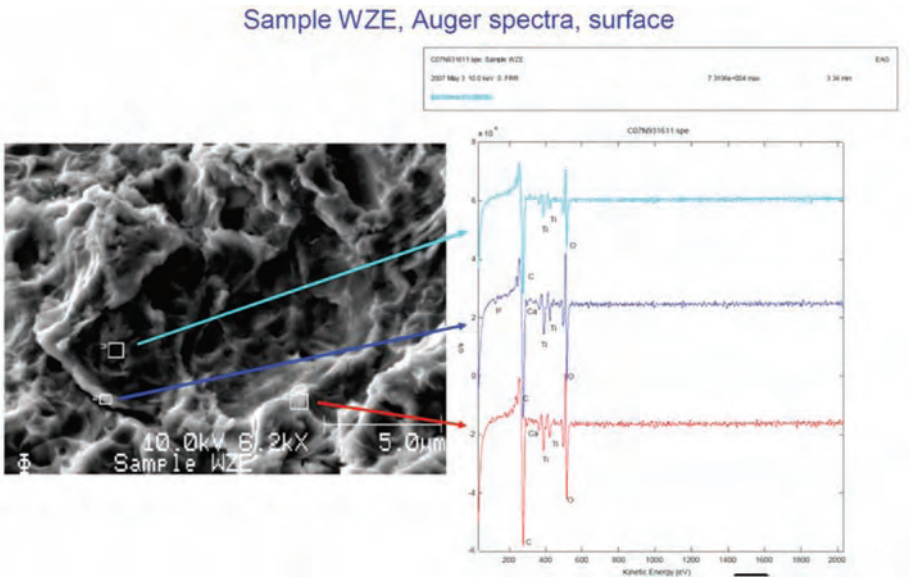

Figure 2. Auger spectroscopy demonstrating even distribution of calcium phosphate.

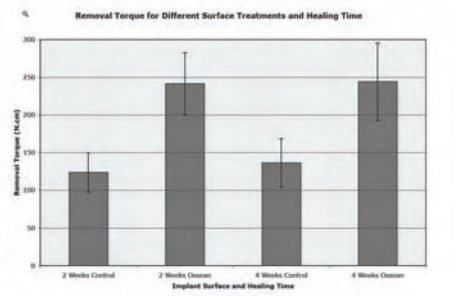

Figure 3. Reverse torque values comparing Ossean versus Non-Ossean surface implants.

adhesion, and can be demonstrated when calcium phosphate materials are present in the correct concentrations.[12] The introduction of a nanotextured surface, further enhanced by molecular impregnation with calcium phosphate (Figure 1), has been shown to significantly enhance osteoblastic activity and dramatically reduce the catabolic phase of bone remodeling.[13]

Vetrone, et al, recently showed in 2008 that nanostructured surfaces influence the behaviour of various cell types and even alter the potential for the differentiation of stem cells.[14] The Ossean research project was initiated in 2005 (Intra-Lock International), and the surface was launched in 2007. It is characterized by a fractal structure with the same pattern repeating itself from the macroscale to the microscale, then to the nanoscale and beyond. There is no addition of particulate material of any kind on the surface. Instead, there is an elemental modification of the surface chemistry within the titanium oxide layer via the incorporation of calcium phosphate. High resolution SEM shows that, at 200,000× magnification, the nanotexture of the surface is pristine and devoid of any discrete particles or contaminants. In addition, the Ossean surface dramatically increases the rate of osteoblastic synthesis of type I collagen, thus promoting osseointegration and reducing the chances of early failure of immediately loaded implant.[15] Even distribution of the calcium phosphate surface is critical to control the physiology of osteoblasts. Calcium phosphate is evident under XPS-ESCA or Auger spectroscopy (Figure 2).

This increase in bone-bonding strength is clearly demonstrated in a study conducted by Marin, et al, where Intra-Lock implants with and without the Ossean surface were tested in a reverse torque removal study (Figure 3). The Ossean surface implants at two weeks after placement exhibited a 100% greater bone adhesion than the implants without the surface modification.[16]

The Ossean surface is clearly biologically active in the sense that bone goes directly to the anabolic phase without intervening bone breakdown. It is postulated that the Ossean surface changes the genetic "fate" or the coding of the surrounding osteogenic cells.[17] This is extremely important in immediate load cases and for extraction site defects where the percentage of initial bone-to-implant contact is compromised.[18]

Similar conclusions can be drawn from another study published by Piatelli, et al. In this human study, Ossean surface implants have been compared to an identical implant with a conventional blasted/acid etched surface. An osteocyte count was performed adjacent to the implant surface and at distance. The results show a 50% increase of those cells compared to the control.[19] These studies and other data confirm the fact that we are not only working at the nanoscale, but also within the true realm of nanotechnology, at the molecular level.

These recent findings are changing the paradigm of tissue healing around implants, and will enable us to redefine the concept of

osseointegration with greater precision and depth of understanding. Our capacity to re-engineer the biologic response around implanted devices will lead to more predictable outcomes in dental implant treatment.

Conflicts

The author has received honorariums and product for research from several companies, including Intra-Lock International.

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Barres usinées pour prothèses implanto-portées

Nicolas Tardif TDC et Hubert Gaucher DDS, MScD

RÉSUMÉ

La CAO/FAO dentaire a évolué sur une période de décennies et offre aux laboratoires dentaires de nouvelles applications numériques pour la fabrication de prothèses implanto-portées utilisant les barres usinées. Un rapport de cas patient illustre les étapes cliniques nécessaires à l'incorporation d'un nouveau logiciel 3D Procera (Nobel Biocare, Centre de production de Québec) utilisé pour le design et l'usinage de barres, permettant ainsi d'excéder les résultats cliniques prévisibles.

Au sujet des auteurs

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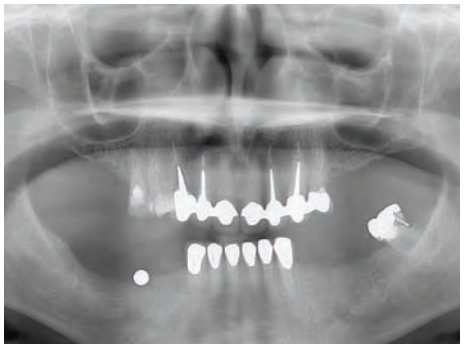


Figure 1 : Panogramme pré-opératoire.

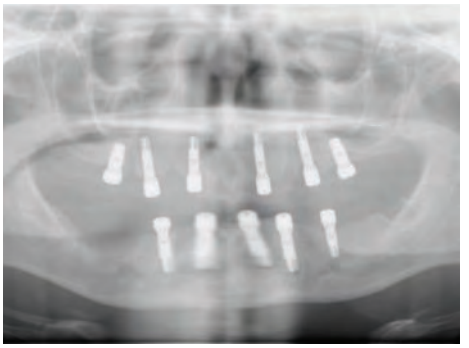


Figure 2 : Panogramme initial post-opératoire.

Déjà en 1965, un premier patient fut traité selon les principes de l'ostéo-intégration. Le Prof Dr Per-Ingvar Brånemark et son équipe avaient mis au point les principes biologiques de l'implantologie contemporaine, définie comme étant une jonction anatomique et fonctionnelle directe entre l'os vivant remanié et la surface de l'implant mis en charge.[1] Ce type d'interface permet le maintien à long terme des implants endo-osseux. De nombreux systèmes d'implants dentaires ont vu le jour depuis avec des taux de succès de 95% à 100% documentés.[2]

C'est en 1985 que sont apparus les deux systèmes de CAO/FAO très répandus aujourd'hui : le système Cerec (Sirona) développé à Zürich par le Prof W. Moerman et M. Brandestini, ing, et le système Procera (NobelBiocare) développé par Matt Anderson en Suède. La CAO/FAO (conception assistée par ordinateur et fabrication assistée par ordinateur) est maintenant possible grâce aux connaissances accrues de l'usinage des matériaux durs et mous. La modélisation de couronnes et ponts est réalisée au moyen de prise d'empreinte par micropalpage ou par laser grâce à l'informatique qui permet de calculer ces acquisitions et qui par la suite permet de faire l'usinage d'un matériau connu.[3,4]

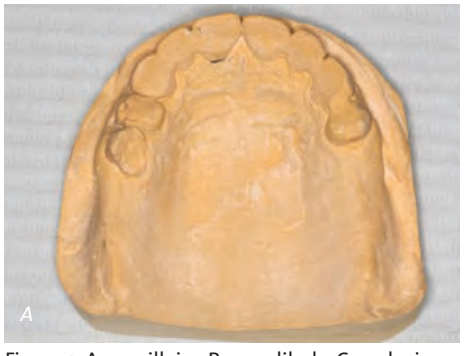
Cas Clinique

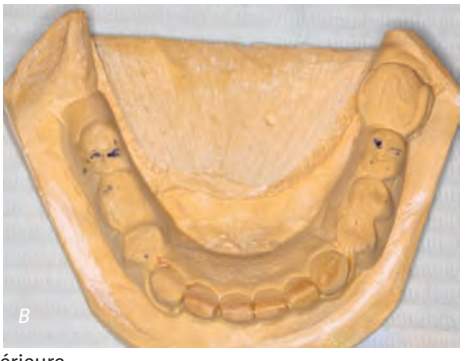
Une patiente âgée de 50 ans, en bonne santé, est référée par un dentiste généraliste qui avait débuté des traitements de prosthodontie chez elle. Au moment de l'examen clinique initial, celle-ci avait sept implants ostéointégrés avec piliers de guérison en place et une prothèse complète conventionnelle de transition regarnie avec un matériau temporaire (Tru-Soft, Bosworth) au maxillaire. Cinq implants ostéointégrés avec piliers de guérison et une prothèse complète de transition regarnie avec le même matériau temporaire étaient aussi en place à la mandibule. Ces prothèses de transition présentaient une béance antérieure prononcée et occasionnaient des problèmes de phonétique pour la patiente. Les tissus étaient normaux et la gencive attachée adéquate en périphérie des implants. La patiente présentait une relation de Classe I des bases osseuses squelettiques étant donné son histoire d'édentation complète récente.

Celle-ci avait subi les extractions complètes des dents haut et bas et le placement de 12 implants (Nobel Biocare Mark III - TIUnite) avec greffes osseuses autogènes concomitantes sur 5 de ces implants, le tout effectué par un parodontiste, compte tenu du pronostic parodontal défavorable pour le maintien des dents restantes. Un rapport du parodontiste confirmant l'ostéointégration de l'ensemble des implants accompagnait la référence du dentiste généraliste. L'implant No 22 visible sur le panogramme initial a été retiré un mois suivant la pose, pour être remplacé par des implants aux sites No 21 et 23. (Figure 1 et Figure 2).

Les modèles d'étude (Figures 3A–C) représentant la dentition en place ont été obtenus du dentiste référant afin d'évaluer l'occlusion et la dimension verticale présente en début de traitement. La patiente rapporte avoir une habitude de serrement, mais aucun signe de problèmes articulaires ou musculaires à l'examen n'est noté. La patiente demande des prothèses fixes implanto-portées haut et bas et souhaite compléter ces traitements de prosthodontie dans un temps rapproché pour raison de disponibilité. Un plan de traitement est élaboré afin de fabriquer les prothèses fixes implanto-portées (barres usinées) avec une séquence des étapes de traitements permettant les vérifications de l'occlusion, de l'esthétique, de la phonétique, d'une dimension verticale acceptable ainsi que la vérification de l'assise passive des barres usinées.

Figure 3. A, maxillaire. B, mandibule, C. occlusion antérieure.





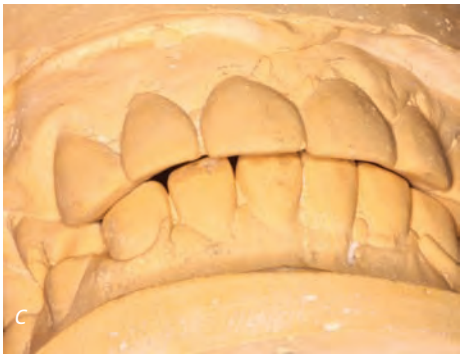


Figure 3. A, maxillaire. B, mandibule, C. occlusion antérieure.

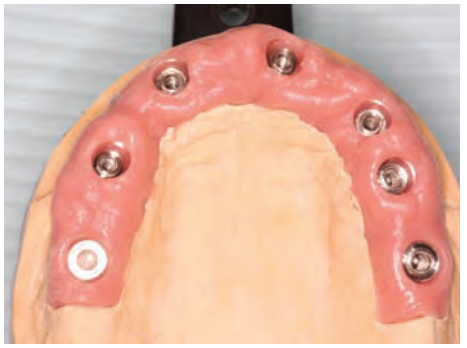


Figure 4A. Modèle de travail maxillaire.

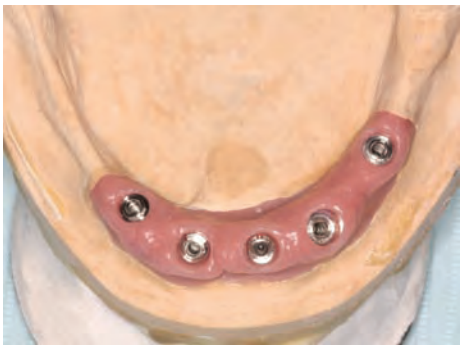


Figure 4B. Modèle de travail mandibule.

Figure 5A. Plaque base maxillaire.

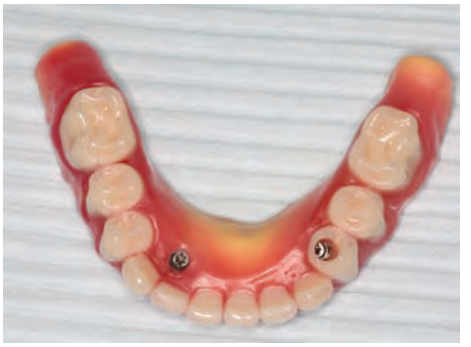


Figure 5B. Plaque base mandibule.

Des empreintes au niveau des têtes des implants utilisant des transferts carrés et des radiographies périapicales confirmant leurs placements adéquats sont prises au moyen de porte-empreintes individuels avec matériau à empreinte du type polyéther (Impregum, 3M-ESPE). Des modèles de travail haut et bas (Figures 4A et B), avec gencives amovibles, sont articulés au moyen de plaques bases (Figures 5A et B) en utilisant l'arc facial Hanau. Le choix des moules des dents de prothèse en acrylique[5] ainsi que la détermination des surplombs verticaux et horizontaux sont en grande partie déterminés par les modèles d'étude pré-opératoires (Figures 3A–C). L'essayage des plaques bases et dents montées dans la cire permettent d'évaluer la dimension verticale de l'occlusion, l'esthétique, ainsi que la phonétique, dans le but d'apporter les corrections nécessaires. Des clefs de repositionnement en silicone pour les dents des prothèses haut et bas ainsi qu'un articulé de vérification sont alors fabriqués à partir des modèles de travail montés sur articulateurs. Ces éléments serviront à replacer précisément les dents sur les barres usinées une fois celles-ci disponibles.

Il existe plusieurs façons de valider le modèle de travail en dentisterie implantaire. L'utilisation d'une gigue de vérification est toutefois avantageuse pour le praticien, puisque cette validation a lieu en bouche. La méthode consiste a placer des transferts métalliques sur le modèle de travail et de les jumeler avec une résine auto-polymérisante de type Duralay ou GC. Il faut s'assurer que la gigue de vérification soit passive sur le modèle de travail. Lorsque le praticien fait l'essaie de la gigue en bouche et qu'il y note une différence dans l'assise, il peut alors sectionner l'acrylique et indexer avec de la résine afin de corriger la gigue en bouche. En retournant cette gigue modifiée au laboratoire, le modèle de travail original pourra être altéré en tenant compte du nouveau positionnement des transferts.[6] Il est très important que le modèle soit parfaitement identique à ce que nous avons en bouche, afin d'éviter des reprises prolongeant indûment le temps de fabrication.

Dans le cas qui nous intéresse, les barres implantaires ont été conçues par CAO/FAO. Leur conception a été réalisée en utilisant le système Nobel Procera et un tout nouveau logiciel disponible depuis 2009. Ce logiciel fut développé par la compagnie Biocad (Québec, Qc) et conçu pour faciliter le travail du technicien lors de la fabrication de barres implanto-portées, de la conception de

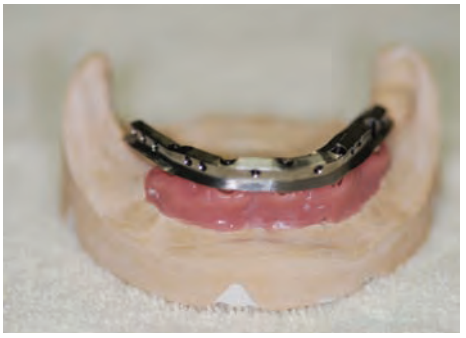


Figure 6A. Barre de Montréal usinée à la mandibule.

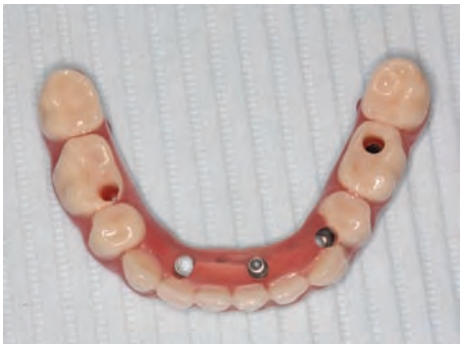


Figure 6B. Vue occlusale de la barre.

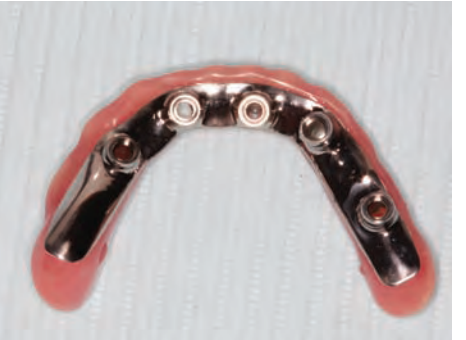


Figure 6C. Vue gingivale de la barre.

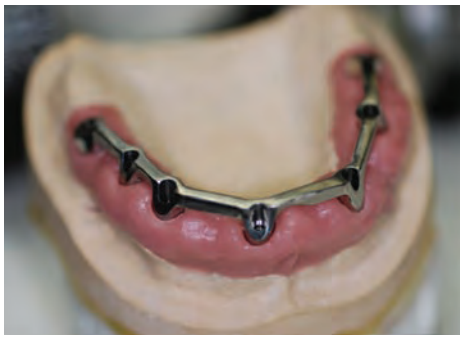


Figure 7A. Barre de Montréal usinée Wrap-Around au maxillaire.

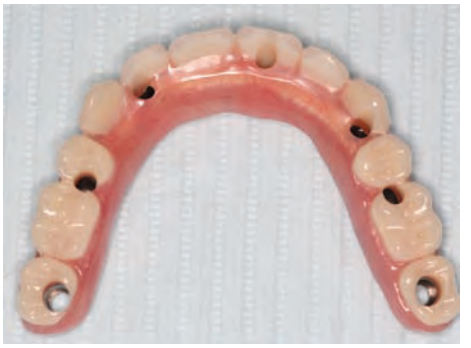


Figure 7B. Vue occlusale de la barre complétée.

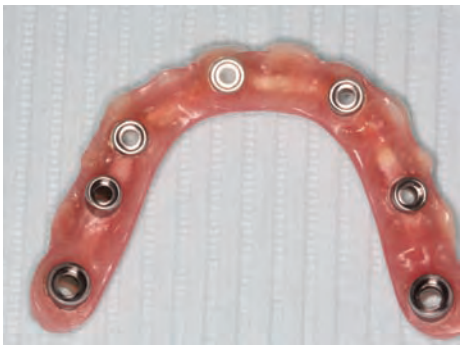


Figure 7C. Vue gingivale de la barre complétée.

couronnes et ponts et de piliers sur implants.

Choix de Barres

Pour la mandibule, nous avons fabriqué une barre de Montréal (Figures 6A–C): une barre dont la partie gingivale de la prothèse sera en titane et à environ 1,5 mm de la gencive. Au maxillaire, une barre Wrap-Around de Montréal a été choisie (Figures 7A–C). Une prescription de fabrication NobelProcera™ est utilisée indiquant notre préférence parmi de multiples types de barre. Les barres peuvent être fraisées selon différentes spécifications, soit : 0, 2, 4, ou 6 degrés avec la possibilité d'incorporer plusieurs attachements : Dalbo, TSB, Ceka, Locator, OSO, Bredent. Des extensions Dolder, de différents volumes, peuvent être usinées ainsi que la barre Hader. Des barres Wrap-Around de Montréal (acrylique en contact avec la crête), de Montréal avec lingual en métal et la barre de Paris, laquelle est amovo-inamovible (structure métallique vissée avec attachements recevant une composante amovible en acrylique) peuvent aussi être prescrites. Une fois le choix de barre complété, nous effectuons l'ordonnance pour la conception de la barre.

Le système Procera pour les barres usinées consiste initialement à reproduire virtuellement le modèle de travail afin de permettre la réalisation des étapes de CAO/FAO ultérieures. Pour ce faire, nous avons besoin d'un modèle de travail en plâtre avec gencive amovible, afin de permettre la lecture des répliques métalliques sur le modèle au moyen d'un scanneur laser spécifique. Celui-ci est disponible uniquement au Nobel Procera Innovation Centre situé dans le Parc technologique de la Ville de Québec. Une fois la gencive enlevée du modèle nous devons avoir au moins 1,5 mm libre de plâtre en périphérie des têtes des répliques non-altérées. Vient ensuite l'acquisition numérique de l'articulé de l'occlusion obtenue en bouche. Une fois les acquisitions numériques terminées (du modèle de travail et de l'articulé), ces fichiers informatiques sont retournés au laboratoire dentaire accompagnés d'une proposition de dessin de barre lequel doit être modifié par l'utilisateur (Figs 8A–D). Ce logiciel novateur de CAO pour barres offre plusieurs outils de conception, tels :

- l'étendue des extensions distales selon la règle de Misch[7]
- outils pour mesurer l'espace sous la barre
- outils pour modifier l'angle de conception de la barre
- fenêtre de coupe axiale en mm carrés permettant de visualiser la gencive, la barre et l'articulé d'occlusion et de valider l'espace disponible pour l'acrylique ainsi que pour les dents prothétiques

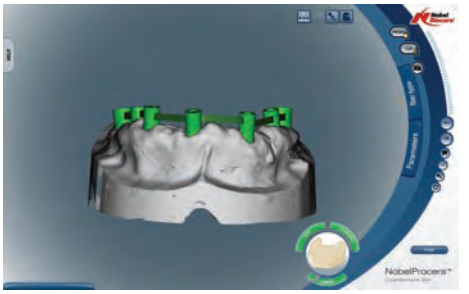


Figure 8A. Modélisation barre supérieure.

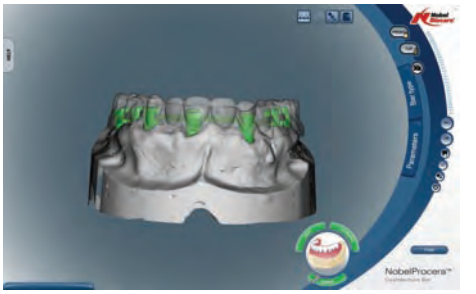


Figure 8B. Superposition des dents sur la barre supérieure.

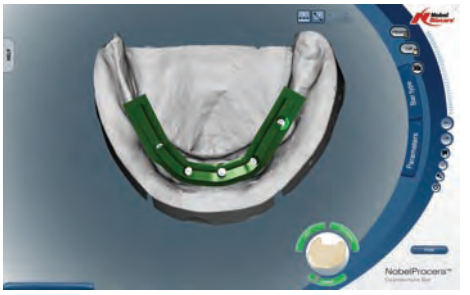


Figure 8C. Modélisation barre inférieure prothèse.

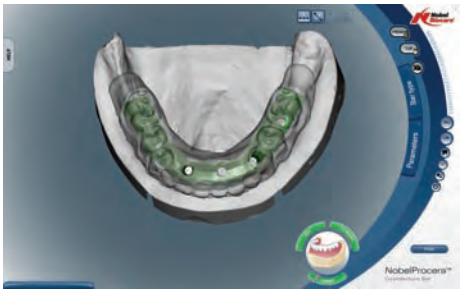


Figure 8D. Superposition des dents de sur la barre inférieure.

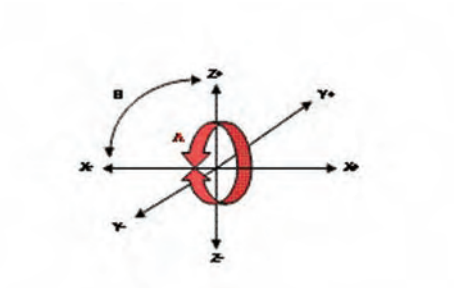


Figure 9. Schéma machine–outils cinq axes.

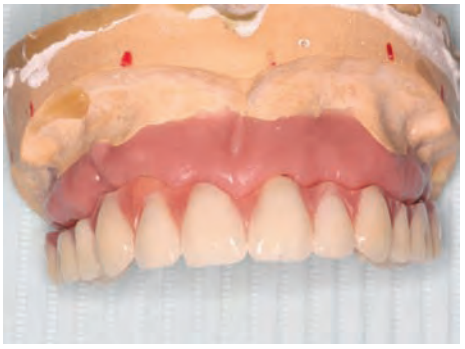


Figure 10A. Cuisson au maxillaire.

Une fois l'étape de la CAO complétée par le laboratoire dentaire, le fichier numérique de la barre est retourné au centre de production afin d'amorcer l'usinage d'un monobloc d'alliage de titane (Ti6A14VL). Une machine-outils Nobel Procera™ à 5 axes fonctionne sur trois axes de translation : gauche/droite, avant/arrière, haut/bas, plus deux axes de rotation : A et B (Figure 9) résulte en un usinage très précis.[8] Une fois la pièce terminée, elle est polie de façon manuelle sous microscope pour produire une surface idéale (Figure 6C). Pour les besoin du cas présent il y avait peu d'espace au maxillaire et il a fallu modifier la barre supérieure pour anguler la cheminée des cylindres, ainsi que libérer l'espace sous la papille incisive, dans le but d'enrober d'acrylique la barre Wrap-Around. (Figure 7B).

Les avantages des barres CAO/FAO comparativement aux barres conventionnelles

Elles utilisent le même matériau que les implants (titane), évitant ainsi tout choc galvanique possible. La barre étant un monobloc, il n'y a donc pas de faiblesse de métal pouvant provenir de porosités dues aux soudures. Il est démontré que l'adaptation des armatures CAO/FAO en titane est valable pour les couronnes et ponts, conférant cette même précision aux barres usinées.[9–12]

La coulée d'une barre implanto-portée conventionnelle présente beaucoup de risques de porosités causées par une technique incorrecte de coulée. Lors des soudures ces porosités sont souvent fonction de la distance ou de l'espace vide séparant les deux pièces à souder.

La barre conventionnelle coulée en titane de grade 1 n'a pas les mêmes résistances physiques qu'une barre usinée. La limite élastique du titane usiné Ti6A14VL est supérieure à 800 MPa, soit plus de trois fois supérieure à celle du titane coulé de grade 1.

En matière de résistance à la fatigue, le Ti6A14VL est l'alliage de titane le plus

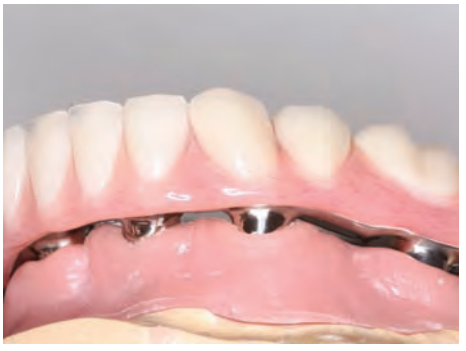


Figure 10B. Cuisson mandibulaire.

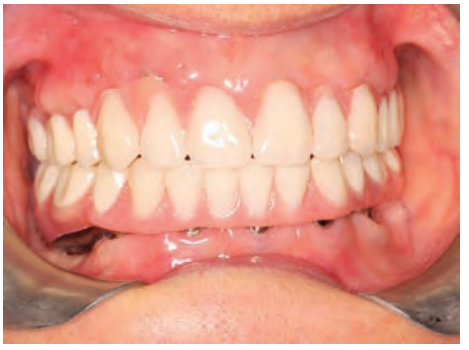


Figure 10C. Prothèse fixes implanto-portées haut et bas.

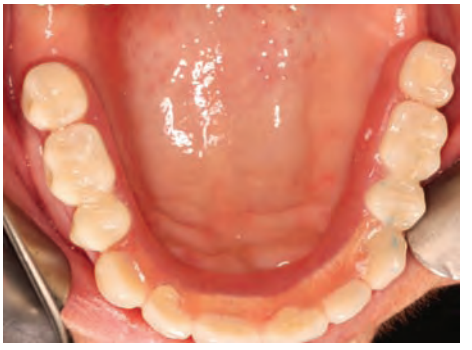


Figure 10D. Vue miroir prothèse maxillaire.

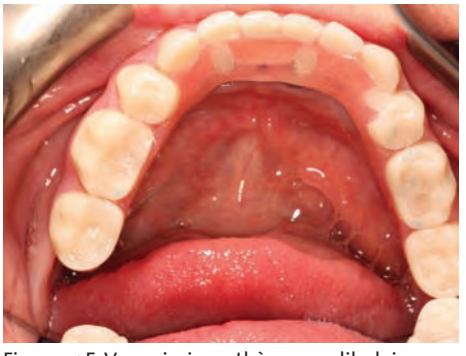


Figure 10E. Vue miroir prothèse mandibulaire.

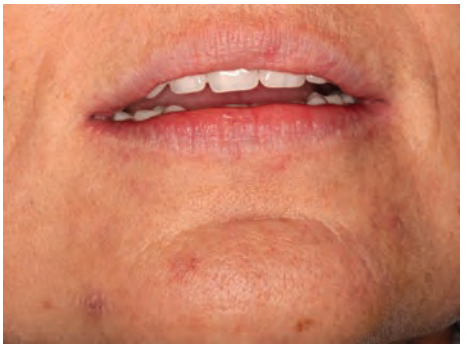


Figure 10F. Position de repos.

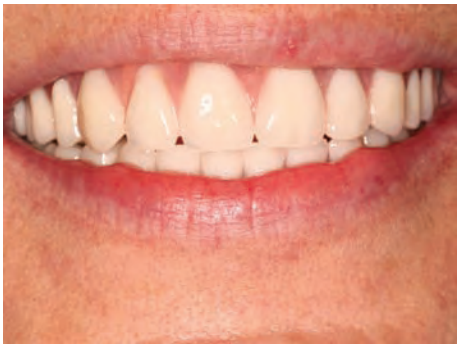


Figure 10G. Dégagement au sourire.

performant et est quatre fois plus léger que l'or. Le Titane usiné est donc un matériau de choix pour les prothèses implanto-portées.[10,11]

Continuation des Étapes Cliniques

Les barres usinées (Figures 6A et 7A) recevront les dents de prothèses et supporteront les rebords des prothèses en utilisant les clefs de positionnement et l'articulé fabriqués à compter des montages préalablement vérifiés en bouche à l'aide des plaques bases vissées (Figures 5A et B).

Le cas est remis en bouche afin d'évaluer les assises passives des barres au moyen de radiographies périapicales et d'une séquence de serrement des vis visant à déceler tout mouvement des barres. Encore une fois, les éléments critiques, tels l'occlusion, l'esthétique et la phonétique sont évalués et doivent être confirmés acceptables par la patiente avant les cuissons finales. Une prise d'articulé en bouche valide la relation sur articulateur avant l'ordonnance pour les cuissons. Un balancement de l'occlusion post-cuisson en laboratoire est recommandé afin de finaliser les contacts occlusaux.

La mise en bouche des prothèses (Figures 10A–G) vérifie l'occlusion centrique stable et l'occlusion bilatérale balancée. Le dégagement adéquat de l'acrylique au maxillaire pour le passage de la soie dentaire est modifié au besoin. C'est alors que les instructions d'hygiène spécifiques sont expliquées à la patiente. Le serrement des vis prothétiques au niveau des implants suit les recommandations du manufacturier et les trous de vis sont obturés au moyen de matériau temporaire.

L'examen de contrôle dans les semaines qui suivent vérifie la stabilité des contacts occlusaux des prothèses ainsi que le serrement non altéré des vis prothétiques. L'adaptation pour la patiente est notée avant de finaliser les obturations des trous de vis au moyen de composites. Dans ce cas précis, dû à ses habitudes de serrement, des empreintes primaires des prothèses sont utilisées pour la confection d'une plaque occlusale pour port nocturne au maxillaire puisque ceci avait été déterminé au plan de traitement initial. Des contrôles d'hygiène bi-annuels sont recommandés à la patiente.

Discussion

La CAO/FAO dentaire s'étend rapidement au domaine de la prothèse implanto-portée. Toutefois, à ce stade, le praticien restaurateur doit toujours suivre l'ensemble des protocoles cliniques prosthodontiques conventionnels. L'optique intra-orale n'a pas encore suffisamment évolué pour produire des empreintes virtuelles visant la CAO/FAO des prothèses complètes implanto-portées. Ce défi est de taille car les praticiens soucieux de progresser vers la technologie CAO/FAO l'attendent ardemment. Pour le moment donc, cette technologie intéresse principalement les laboratoires dentaires et les manufacturiers d'implants dentaires. Les frais de laboratoire pour le praticien utilisant la technologie de barres usinées sont comparables aux frais associés aux barres coulées conventionnelles. Reste à établir, de manière non équivoque, la supériorité des barres usinées au moyen d'études cliniques aléatoires. À notre connaissance de telles études n'existent pas et devraient être entreprises afin de favoriser la mise en marché des barres usinées par les divers manufacturiers de systèmes CAO/FAO.

Il est à noter que le présent cas clinique offre peu d'espace inter-arches pour les prothèses implanto-portées et ne permet pas la possibilité de placer des piliers intermédiaires servant d'assises pour les barres. Ces barres usinées offrent-elles des tolérances de machinage supérieures aux différentes composantes (piliers et cylindres) déjà disponibles sur le marché?

À ce stade, l'essor de la CAO/FAO impose une courbe d'apprentissage nettement plus exigeante pour les laboratoires dentaires que pour les praticiens utilisateurs de barres usinées.

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Milled Bars for Implant-Supported Prostheses

Nicolas Tardif TDC and Hubert Gaucher DDS, MScD

ABSTRACT

Dental CAD/CAM technology has been evolving over many decades and offers dental laboratories new computerized applications for the fabrication of implant supported prostheses using machined bars. A patient case report illustrates the clinical procedures necessary for the successful incorporation of a new Procera 3D software (Nobel Biocare, Quebec City Production Centre) used in the design and the machining of bars, thus ensuring better predictable clinical outcomes.

About the Authors

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As early as 1965, the first patient was treated using osseointegration principles. Professor Per-Ingvar Brånemark and his team had developed the biological principles of contemporary implantology, defined as being a direct structural and functional connection between the adapted living bone and the surface of a load-bearing implant.[1] This type of interface allows endosseous implants to be maintained in the long term. Many dental implant systems have emerged since then, with documented success rates of 95–100%.[2]

The two CAD/CAM systems that are most widespread today appeared in 1985: the Cerec system (Sirona), developed in Zurich by Prof. W. Moerman and engineer Dr. M. Brandestini, and the Procera system (NobelBiocare), developed by Matt Anderson in Sweden. CAD/CAM (computer-aided design/
computer-aided manufacturing) is now possible due to improved knowledge about milling hard and soft materials. Crowns and bridges are modelled by making an impression with profilometry or laser using computers in order to calculate acquisitions and subsequently mill a known material.[3,4]

Clinical Case

A female patient aged 50, in good health, was referred by a general dentist who had started prosthodontic treatments with her. At the time of the initial clinical examination, she had seven osteointegrated implants with healing abutments in place and a complete conventional transition prosthesis relined with temporary material (Trusoft, Bosworth, Skokie, IL) in the maxilla. Five osteointegrated implants with healing abutments and a complete transition prosthesis relined with the same temporary material were also in place in the mandible. The transition prostheses had a pronounced anterior open bite and were causing phonetic problems for the patient. Tissue was normal and the attached gingiva adequate around the implants. The patient had a class I relationship in terms of skeletal bone bases, given her history of recent full-mouth tooth extraction.

She had undergone full-mouth extraction of upper and lower teeth and the placement of 12 implants (Nobel Biocare Mark III – TIUnite, Richmond Hill, ON) with concomitant autogenous bone grafts on five of the implants, with all the work being performed by a periodontist, given the unfavourable periodontal prognosis for maintaining the remaining teeth. A report from the periodontist confirming osseointegration of all the implants accompanied the referral from the general dentist. Implant number 22, visible on the initial panogram, was removed one month after its insertion, to be replaced by implants at sites number 21 and 23 (see page 31, Figure 1 and Figure 2).

The study models (see page 31, Figures 3A to C), representing existing dentition, were obtained from the referring dentist in order to assess occlusion and the vertical dimension existing at the start of treatment. The patient reported a habit of teeth clenching, but no sign of joint or muscle problems were noted on examination. The patient asked for upper and lower implant-supported fixed prostheses and wanted to complete the prosthodontal treatments in short order because of availability. A treatment plan was developed for manufacturing the implant-supported fixed prostheses (milled bars) with a sequence of treatment steps for checking occlusion, esthetics, phonetics, an acceptable vertical dimension and checking the passive seating of the milled bars.

Impressions of the implant heads using square transfers and periapical radiographs to confirm their appropriate placements were taken using individual impression trays with polyether impression material (Impregum, 3M-ESPE, London, ON). Upper and lower working models (see page 32, Figures 4A and 4B) with removable gums were articulated by means of denture bases (see page 32, Figures 5A and 5B) using the Hanau facebow. The choice of acrylic prosthetic tooth moulds[5] and determination of overbites and overjets were to a large extent determined by the pre-operative study models (see Figures 3A to C). Denture bases and a waxed teeth assembly were tried out in order to assess the vertical dimension of occlusion, esthetics and phonetics, so that the necessary corrections could be made. Silicone positioning keys for the upper and lower prosthetic teeth and a check bite were then manufactured based on the working models mounted on articulators. Those components would be used to position the teeth precisely on the milled bars once available.

There are several ways of validating the working model in implant dentistry. However, the use of a verification jig is beneficial for the practitioner, since the validation is intra-oral. The method consists of placing metal transfers on the working model and matching them with a Duralay or GC autopolymerizing resin. It is important to ensure that the verification jig is passive on the working model. When a practitioner tries the jig intraorally and notes a difference in seating, he can then section the acrylic and index with resin in order to correct the jig intraorally. By returning the modified jig to the laboratory, the original working model can be altered to take into account the new positions of the transfers.[6] It is very important that the model is completely identical to what we have in the mouth, to avoid reworks which can extend manufacturing time unduly.

In our case, the implant bars were designed with CAD/CAM. They were designed using the Nobel Procera system (Nobel Biocare) and a brand new software package available since 2009. The software was developed by Biocad (Quebec City, QC) and designed to facilitate the technician's job when manufacturing implant-supported bars, designing crowns and bridges and implant abutments.

Choice of Bars

For the mandible, we manufactured a Montreal bar (Figures 6A to C): a bar with the gingival part of the prosthesis made of titanium and about 1.5 mm from the gum. For the maxilla, a wrap-around Montreal bar was chosen (see page 33, Figures 7A to C). A NobelProcera (Nobel Biocare) manufacturing prescription was used, indicating our preference among multiple types of bar. Bars can also be milled to different specifications, namely: 0, 2, 4, or 6 degrees, with the possibility of incorporating several attachments: Dalbo, TSB, Ceka, Locator, OSO, or Bredent. Dolder extensions, with

different volumes, can also be milled, as can the Hader bar. Montreal wrap-around bars (acrylic in contact with the ridge), Montreal bars with metallic lingual and the Paris bar, which is permanent-removable (a metal structure screwed in with attachments which receive a removable acrylic component) can also be prescribed. Once the choice of bar was made, we prepared the prescription for designing the bar.

The Procera system for milled bars consists initially of virtually reproducing the working model so that subsequent CAD/CAM stages can be carried out. To achieve this, we needed a plaster working model with a detachable gingiva, so that a specific laser scanner could be used to read metal dies on the model. This is available only at the Nobel Procera Innovation Centre located in the Québec Metro High Tech Park. Once the gingiva was removed from the model, we needed to have at least 1.5 mm free of plaster around the heads of the unaltered dies. Then came the intra-oral digital acquisition of the occlusal bite. Once the digital acquisitions were completed (of the working model and the bite), the computer files were returned to the dental laboratory together with a bar design proposal to be modified by the user (see page 33, Figures 8A to D). This innovative CAD software for bars offers several design tools, such as:

- span of distal extensions using Misch's rule[7]
- tools for measuring the space below the bar
- tools for modifying the bar design angle
- axial section window in square mm so that the gingiva, bar and occlusal bite can be visualized and the space available for acrylic and for prosthetic teeth can be validated

Once the CAD stage was completed by the dental laboratory, the digital file for the bar was returned to the production centre in order to start milling the titanium alloy monoblock (Ti6A14VL). A five-axis Nobel Procera machine-tool works on three translation axes: left/right, in front/behind, high/low, plus two rotation axes: A and B (see page 34, Figure 9), resulting in very precise milling.[8] Once the part was completed, it was polished by hand under a microscope to produce an ideal surface (see Figure 6C). For the needs of this case, there was little space in the maxilla and the upper bar had to be modified to angle the cylinders' chimneys and to free up space under the incisive papilla, in order to coat the wrap-around bar with acrylic. (see Figure 7B)

The Advantages of CAD/CAM Bars Compared with Conventional Bars

They use the same material as implants (titanium), thus avoiding any possible galvanic shock. Since the bar is a monoblock, there is no metal weakness which can result from porosity due to welding. It has been demonstrated that adapting titanium CAD/CAM assemblies is valuable for crowns and bridges, conferring the same precision on milled bars.[9–12]

Casting a conventional implant-supported bar poses many risks of porosity caused by incorrect casting technique. When welding, porosity is often based on the distance or empty space separating the two pieces to be welded.

A cast grade 1 titanium conventional bar does not have the same physical resistance as a milled bar. The elastic limit of milled Ti6A14VL titanium is over 800 MPa, more than three times greater than grade 1 cast titanium.

With respect to fatigue resistance, Ti6A14VL is the best performing titanium alloy and is four times lighter than gold. Milled titanium is therefore an excellent material for implant-supported prostheses.[10,11]

Continuation of Clinical Steps

The milled bars (see Figures 6a and 7a) would receive the prosthetic teeth and support the prosthetic rims using the positioning keys and bite manufactured based on assemblies checked intra-orally in advance using screwed-in denture bases (see Figures 5A and B).

The bar was again placed intra-orally to assess the bars' passive seating using periapical radiography and a sequence of screw tightening to detect any bar movement. Once again, the critical elements, such as occlusion, esthetics, and phonetics, were assessed and had to be confirmed acceptable by the patient before final curing. An intra-oral check bite was used to validate the articulator cast mountings before the prescription for curing. A post-curing balancing of occlusion in the laboratory is recommended for finalizing occlusal contacts.

Intra-oral placement of the prostheses (see page 34, Figures 10A to G) was used to check stable centric occlusion and balanced bilateral occlusion. Adequate clearance between the acrylic and maxilla for dental floss was modified as needed. At this time, the specific hygiene instructions were explained to the patient. Tightening the prosthetic screws in the implants followed the manufacturer's recommendations and the screw holes were capped with temporary material.

The follow-up examination in the following weeks checked the stability of the prosthetic occlusal contacts and that the tightening of the prosthetic screws was unchanged. The patient's adaptations were noted before finalizing the screw-hole caps using composites. In this specific case, because of her clenching habit, primary imprints of the prostheses were used to produce a bite plate to be worn on the maxilla at night, since that had been determined in the initial treatment plan. The patient was recommended to have bi-annual hygiene check-ups.

Discussion

Dental CAD/CAM is rapidly spreading to the realm of the implant-supported prosthesis. However, at this stage, the restorative practitioner must always follow all the conventional prosthodontic clinical protocols. The intra-oral optic has not developed sufficiently to produce virtual impressions for complete CAD/CAM implant-supported prostheses. This is a sizable challenge because practitioners wishing to progress towards CAD/CAM technology are awaiting it passionately. Therefore, for the time being, this technology is of interest mainly for dental laboratories and dental implant manufacturers. The laboratory costs for practitioners using milled bar technology are comparable to the costs associated with conventional cast bars. It needs to be unequivocally established

whether milled bars are superior, using randomized clinical trials. To our knowledge, studies of this kind do not exist and should be undertaken in order to promote the marketing of milled bars by the various CAD/CAM system manufacturers.

It is important to note that this clinical case offered little inter-arch space for the implant-supported prostheses and did not allow the possibility of placing intermediate abutments as foundations for the bars. Do these milled bars offer milling tolerances which are superior to the various components (abutments and cylinders) already available on the market?

At this stage, the expansion of CAD/CAM is placing a much more demanding learning curve on dental laboratories than on practitioners who make use of milled bars.

Conflicts

None declared.

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Achieving Initial Implant Stability – Observations on the Effect of Implant Body Macro-Design and Osteotomy Design

Dennis P.A. Nimchuk, DDS, FRCD

ABSTRACT

Many factors influence obtaining initial implant stability. One of the most relevant factors is the macro-design of the implant. Tapering implants with aggressive thread patterns allow an implant to be placed under higher insertion torque values that will permit compression of the body of the implant against the bony wall of the osteotomy. Some implants are designed to maximize bone compression at the apex, while others provide even bone compression along the implant length; still others concentrate the compressive forces in the crestal area. Depending on the circumstances of the proposed implant site, utilizing a single implant design may not always be the most suitable when it comes to obtaining satisfactory initial implant stability. This is particularly relevant when implants are inserted as an immediate implantation protocol. Because of the variability of conditions of surgical sites, the selection of an implant based on macro-design features may have site specificity relevance.

About the Author

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RÉSUMÉ

Plusieurs facteurs influencent la stabilité initiale de l'implant. L'un de ces facteurs les plus pertinents est le macro-design de l'implant. Le profilage et le filetage des implants permettent à l'implant d'être placé sous des couples de serrage d'insertion plus élevés qui faciliteront la compression du corps de l'implant sur la paroi osseuse de l'ostéotomie. Certains implants sont conçus pour maximiser la compression osseuse à l'apex, d'autres procurent une compression osseuse uniforme le long de l'implant, alors que d'autres concentrent les forces compressives dans la zone apicale. Selon les circonstances de l'implant proposé, l'utilisation d'un seul design peut ne pas toujours convenir lorsqu'il s'agit d'obtenir une stabilité initiale de l'implant satisfaisante. Ceci est particulièrement pertinent lorsque les implants sont insérés selon un protocole d'implants immédiats. En raison de la variabilité des champs opératoires, le choix d'un implant selon les caractéristiques de macro-design peut avoir une pertinence spécifique au site.

Dental implants are now a widely established modality for tooth replacement. Four decades studying the utilization of dental implants has produced widespread corroboration validating their effectiveness as a viable treatment protocol.[1–3] Until recently these studies have been based on a two-stage submerged surgical protocol, having an initial healing phase of 4 to 5 months for sufficient bone development,[1] followed by another interval delay for second-stage soft tissue surgical healing, followed further by appointments for impressioning of the implant location and finally followed by a term of laboratory fabrication and installation into the patient. The total treatment time for an implant supported prosthesis with this protocol often takes 7 to 8 months. From a patient perspective this process may be viewed as unsatisfactory because of the morbidity of experiencing two surgeries plus the long treatment interval before obtaining the final delivery of a restoration.

Currently there is a developing trend towards establishing a single-stage, non-submerged surgical procedure along with early or even immediate loading protocols. This trend is a significant deviation from the criteria of delayed loading established by Brånemark et al. The Brånemark protocol advocated a 20-week interval healing period after implant placement to allow for bone development around the dental implant.[1] It was proposed that early loading soon after the first-stage surgery would lead to a fibrous tissue formation around the implant because of "micro-motion" and that implants placed under such a shortened time protocol would fail to integrate.[4–6]

A number of studies have implicated micro-motion as a factor in fibrous tissue formation at the expense of osseointegration.[7–10] Other more recent studies have indicated that low-intensity micro-motion, during the healing phase, may actually stimulate bone healing and bone development around an implant and it may be that excessive micro-motion on implants having weak initial stability is what is responsible for the failure of integration.[13–15] Micro-motion in the order of 50–150 microns therefore may be tolerable and may even be a desirable stimuli for osseointegration,[15,16] depending on the implant macro-design and micro surface topography.[16]

Primary or initial implant stability is viewed as a prerequisite to establish adequate mechanical fixation to provide for undisturbed bone healing and to overcome the effect of any direct or indirect stresses which may result in a mechanical overload during the critical time of early osseous rebuild.[17–20] Primary stability is considered to be a highly critical factor in influencing the successful osseointegration of single stage surgeries where the implant is exposed into the intra-oral environment.[21] Several factors, such as implant design, preparation technique,[22] and the quality and quantity of local bone influence the achievement of initial stability.[23] Several non-invasive clinical test systems have been devised to evaluate the degree of initial implant stability; i.e., insertion torque, periotest, resonance frequency analysis. Any of these systems individually or in combination can be readily utilized in the clinical setting for a relative verification of initial implant stability. Based on resonance frequency analysis, studies have demonstrated that primary implant stability is improved where the density of the bone is greater,[23–27] such as in the lower jaw, by the proximity and thickness of the cortical plates[24] and by the degree of bone compression induced from creating an undersized osteotomy and inserting a slightly oversized implant.[23,25,28]

Based on the criteria of bone compression, there may be a correlation between the location and design of the osteotomy and the macro-geometry of the implant, since different implants are designed to compress bone in differing ways.[27,29–32] When it comes to placing an immediate implant in a an asymmetrical or funnel shaped osteotomy residual to an exodontia, the requirements for primary stability and elimination of excessive micro-movement becomes more challenging to accomplish. Development of optimum security and stabilization in the extraction site will become more dependent on the osteotomy technique and on the behaviour of the bone compression qualities of the implant than would be in a delayed implant placement procedure. Clinician feel, or torque insertion controllers built into the

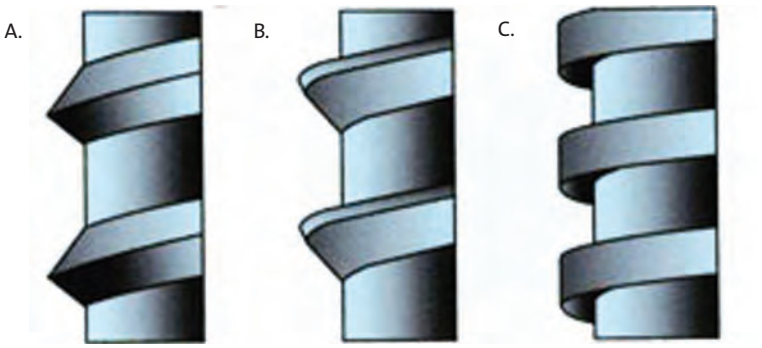


Figure 1. The three basic designs that are used with dental implants: *A*,"V-shaped" threads; *B*, reverse-buttress threads; and *C*, square threads.

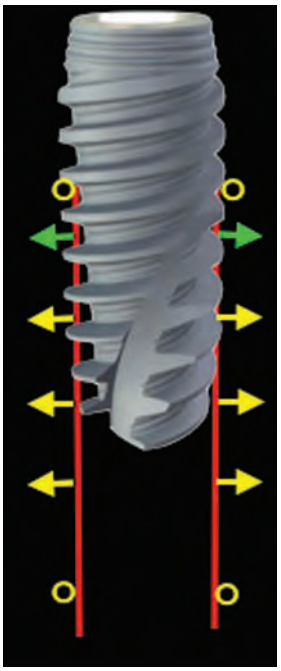


Figure 2. A tapering body implant placed into a straight osteotomy and having aggressive parallel external threads will displace bone with the threads but will minimally compress bone unless the osteotomy is undersized considerably to engage the implant body itself. Red = areas of high compression; orange = areas of moderate to high compression; green = areas of moderate compression; yellow = areas of light compression.

implant motors or torque wrenches will give a reasonable indication as to the degree of stability obtained. Recently, resonance frequency analysis (RAF) instruments have been introduced which will give an additional quantitative measurement as to the degree of primary stability.[33–39]

Implant Designs Features

Implant Body Designs

There are three basic types of implant shapes, (1) cylindrical non-threaded, (2) parallel-walled with threads, and (3) tapered with threads. Each of these designs can be used as a compression implant if the osteotomy is undersized relative to the implant body diameter.[26] However, certain features such as self-tapping threads,[32] dramatically increase the ability to insert implants more easily and with more compression.

Thread Designs

There are three basic designs which are used with dental implants; "V-shaped" threads (Figure 1A), reverse-buttress threads (Figure 1B), and square threads (Figure 1C). The threads are designed to provide for the self-tapping feature and all of them will work reasonably effectively for this purpose, excepting the square threads, which usually will need a separate bone tap for insertion into denser bone. The differing thread designs, depending on the pitch and extension of the treads will enable more or less elemental degrees of fixation at placement time. Differences in stabilization will also occur after bone healing due to establishment of different values in resisting functional shear forces.[40,41] Generally, the more aggressive the threads are, the greater will be the potential for achieving higher primary fixation values because of the more effective tapping action. On the other hand, if threads become too aggressive they will be more difficult to install in denser zones of bone. In porous bone, very aggressively threaded implants will not always act as true compression implants because as the extension of the threads cut into the bone, they induce little compression against the body wall of the implant (Figure 2). The bone between the extended threads merely fills in the reservoir of space between the threads. High compression fixation comes from the surface area of the body of the implant itself, firmly wedging against a wall of resistant bone.

Surface Designs

Original implants aka. Brånemark, were relatively smooth, having a rudimentary surface texture derived only from the machining process. Later, implants were designed to have varying degrees of surface roughness or texture that proved to increase the surface area and that would attract a higher percentage of bone apposition allowing for an accelerated time-interval restorative phase. Introducing medium values of surface roughness of approximately .5 to 1.8 microns has been shown to significantly enhance ongoing osseo-integration as well as producing greater reverse-torque values.[42,43] The practical application of dependable, early, osseointegration means shorter delays for restoration and that clinicians, when unscrewing healing abutments at shorter healing time intervals, will not find the implants also unscrewing.

Implant Compression Performance

An implant's ability to compress bone, for the most part, will be based on how the implant body form and diameter is matched to the osteotomy form and diameter. Three general combinations are available.

A. A parallel walled implant placed into a parallel walled osteotomy that is slightly undersized.
B. A tapering walled implant placed into a parallel walled osteotomy that is slightly undersized.
C. A tapering walled implant placed into a tapering walled osteotomy that is slightly undersized.

Generally, combination A will produce gentle and even compression throughout the entire interface of the implant body (Figures 3 and 4). Combination B will produce a greater

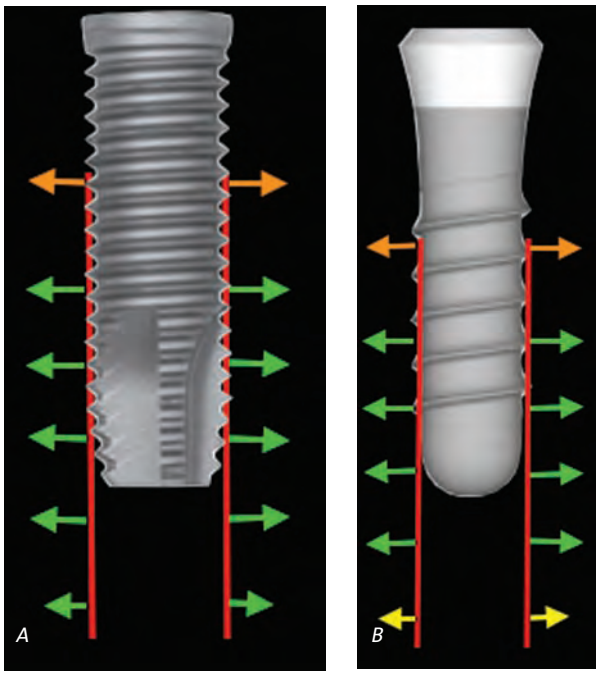


Figure 3. A and B, Two examples of straight walled implants placed into straight osteotomies provide for mild and uniform concentration of bone compression. Red = areas of high compression; orange = areas of moderate to high compression; green = areas of moderate compression; yellow = areas of light compression.

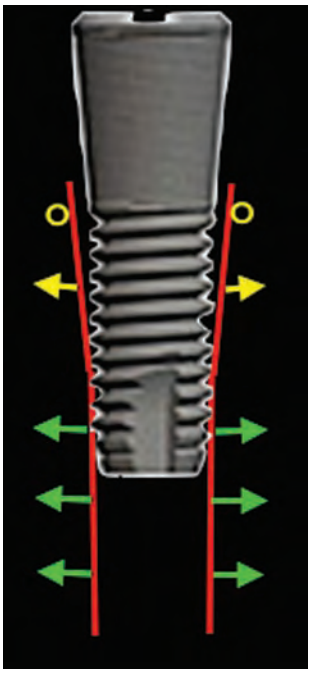


Figure 4. A straight implant with a crestal flare placed into a non-engaging countersink provides for mild and even bone compression but not at the crest. Red = areas of high compression; orange = areas of moderate to high compression; green = areas of moderate compression; yellow = areas of light compression.

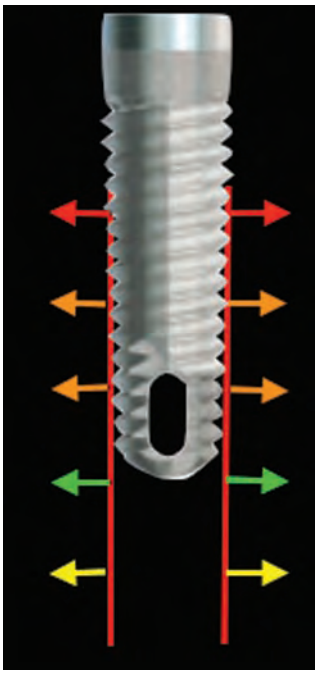


Figure 5. A tapering implant placed into a straight walled osteotomy concentrates compression in the crestal region. Red = areas of high compression; orange = areas of moderate to high compression; green = areas of moderate compression; yellow = areas of light compression.

concentration of compression than combination A, and the compression will be more localized at the crestal zone of the interface of the implant body (Figure 5). Combination C will produce a higher concentration of compression than either combination A or B, and this compression will be most concentrated at the apical zone of the implant interface (Figures 6 and 7).

A wide range of variability as to compression may occur with any of these combinations, based on the relative degree of the undersize, the density of the bone, the length of the implant, the width of the implant, the proximity of the cortical plates, surface texture of the implant and the thread pattern of the implant.

Bone Compression and Compression-Induced Osteonecrosis

When the Nobel "Replace" implant was first introduced some clinicians observed a lack of osseointegration and extended bone resorbtion arising with the use of this implant. The "new" Replace behaved vastly different from traditional straight walled implants in its insertion handling. The Replace, being a tapering implant, was designed to be inserted into a tapering osteotomy and became capable of developing extremely high levels of resistance to insertion, particularly into dense bone sites. It was suggested that a phenomenon could exist whereby bone would necrose if subjected to very high compression forces. The theory is that compression of bone beyond its physiologic limits may result in ischemia leading to osseous necrosis.[44–46] In response to this, Nobel advocated an arbitrary value of 35 Ncm, based on a measured insertion torque that would be considered adequate for primary stability and would not be likely to create any bone compression damage. This theory has never been validated not has the concept of bone necrosis from high values of dental implant bone compression been validated. On the contrary, there is accumulating evidence that very high insertion torque values are not destructive but within reason, may be desirable to evolve the clinical application of single stage implants to be early or immediately loaded. Khayat et al.[47] have presented results utilizing Zimmer tapered implants inserted with torques of up to 176 Ncm, and followed up to 1 year, showing no sign of pressure necrosis. Current histologic research by Trisi[48] evaluating the effect of high insertion torques of 110 Ncm failed to demonstrate adverse outcomes. Meltzer et al.[49] followed a series of Biomet 3I implants placed with torque values averaging 90 Ncm with no unusual radiographic or crestal bone changes. There is a practical limit to high insertion torque which may deform or cause damage to the macrogeometric features of the implant itself or the driver tips. Some manufacturers caution that the implant structure itself may not sustain insertion torques beyond a certain value. Also is the problem of fully seating certain implant

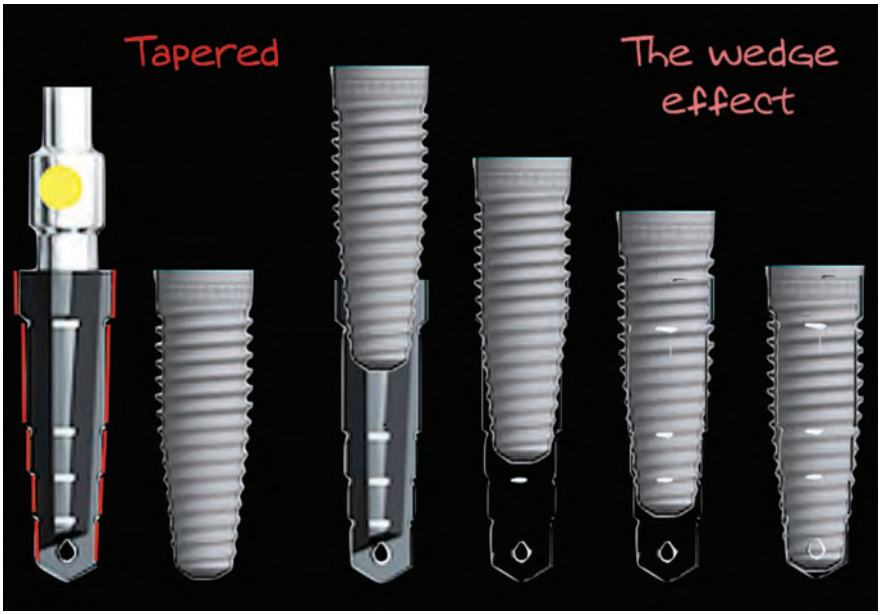


Figure 6. A tapering implant placed into a tapering osteotomy will continue to develop apical compression as it progressively is turned in to complete depth.

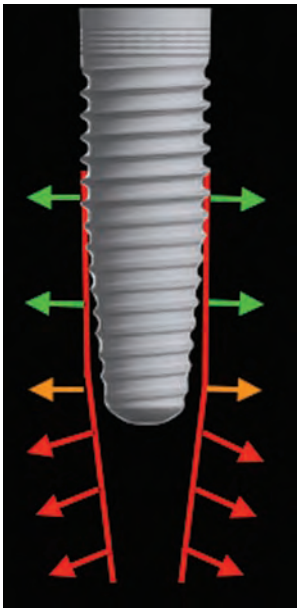


Figure 7. Tapering implant into a tapering osteotomy concentrates compressive forces in the apical zone. Red = areas of high compression; orange = areas of moderate to high compression; green = areas of moderate compression; yellow = areas of light compression.

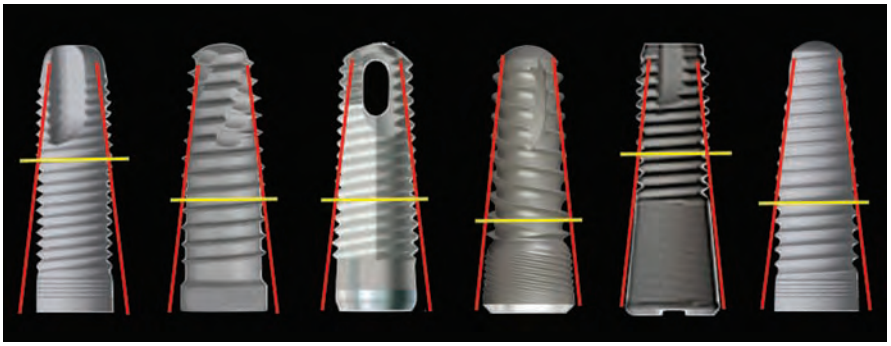


Figure 8. A series of different tapered implants placed into arbitrarily flared maxillary sockets showing non-engagement at the crest but only below the yellow lines.

geometries. These are clinically dependent situations and may require the use of separate bone taps or dense bone drills.

General Applications for Implant Selection

1. D2 or D3 Bone – *two stage procedure*. Almost any implant can be placed effectively and will have adequate primary stability.
2. D2 or D3 Bone – *single stage procedure – delayed loading*. Recommended is a tapering implant with moderate to aggressive thread design in an undersized osteotomy.
3. D2 or D3 Bone – *single stage procedure and with immediate or early loading*. Recommended is a tapering implant with moderate to aggressive thread design in an undersized osteotomy. An implant with even body compression or apical concentration or crestal concentration will all work well.
4. D1 Bone – *single or two-stage procedure*. Use parallel walled implants with moderate threads or with tapering implants, use dense bone drill so that the implant will go to place.
5. D4 Bone – *two stage procedure*. Almost any implant can be placed with adequate primary stability if the osteotomy is undersized enough. These sites may benefit from special micro-texturing and surface treatments or by having a high crystallinity HA coating.
6. D4 Bone – *single stage procedure*. These circumstances are indicated for a high compression tapering implant with aggressive thread design preferably with one which produces crestal compression in order to engage the cortical plates (see Figure 4).

Specific Applications for Implant Selection

Immediate Implants: Because of the funnel shape, a high compression, highly tapered implant that focuses compression in the apical zone is recommended (see Figures 6 and 7 and Figures 8 to 11).

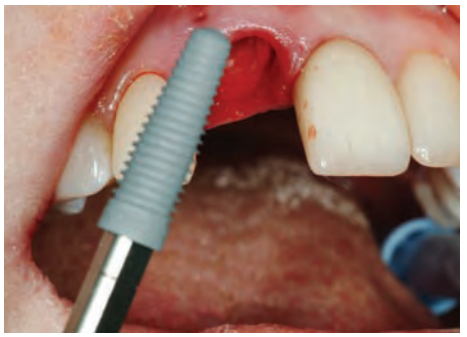


Figure 9. Tapered implant/tapered osteotomy.

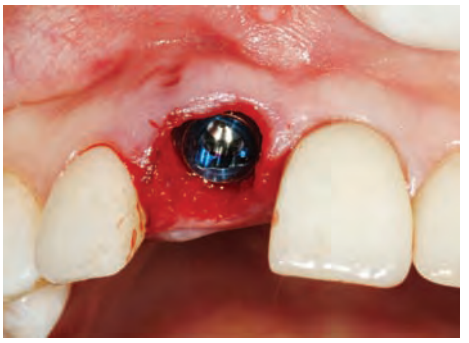
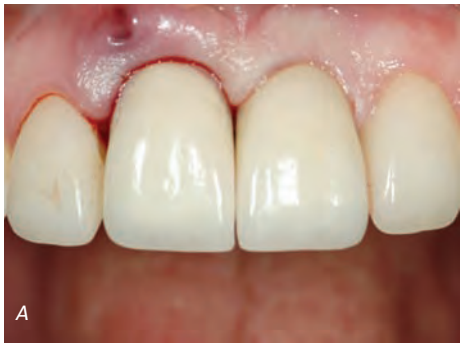


Figure 10. Implant inserted right central.



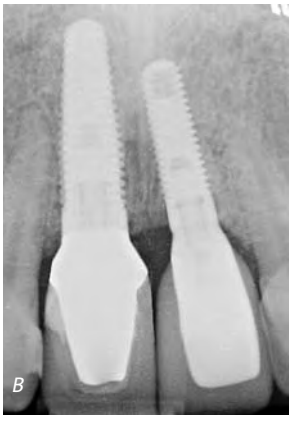
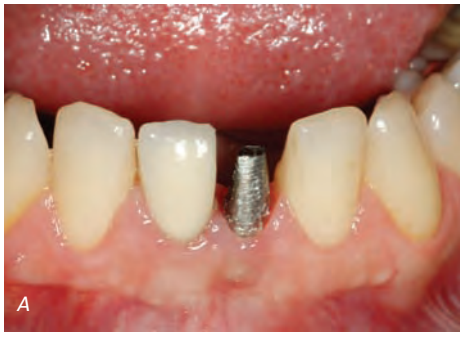


Figure 11. *A*, Immediate post and temporary. *B*, Radiograph at 24 weeks.



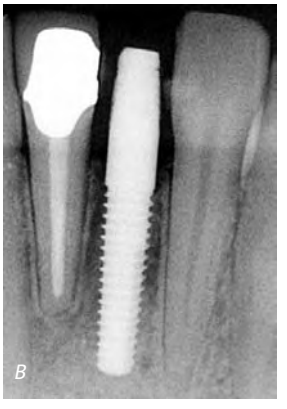
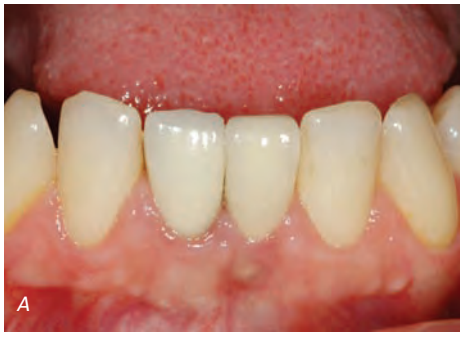


Figure 12. *A*, One-piece implant, temporary crown removed; *B*, radiograph.



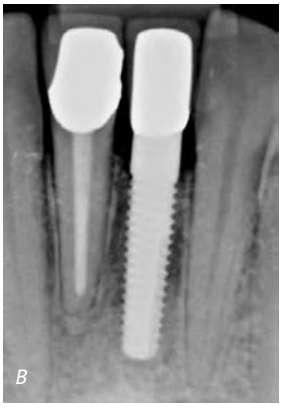


Figure 13. *A*, One piece implant with crown; *B*, completed radiograph

One-Piece Implants: These implants are exposed at insertion time and will need to be temporized and to some extent, will be immediately loaded. Also, the abutment portion of the implant often will have to be prepared at insertion time with handpiece. This protocol will require an implant designed for high initial stability in an undersized osteotomy and utilizing maximum length into supportive bone (see Figures 12 and 13).

Sinus Elevations Performed Crestally: This is also known as the Summers method with simultaneous insertion of single stage implants. Recommended is a tapering implant that has compression concentrations at the crestal area and which will enable rigid fixation against the crestal cortical plates and thereby also assist preventing the implant from popping through the osteotomy and

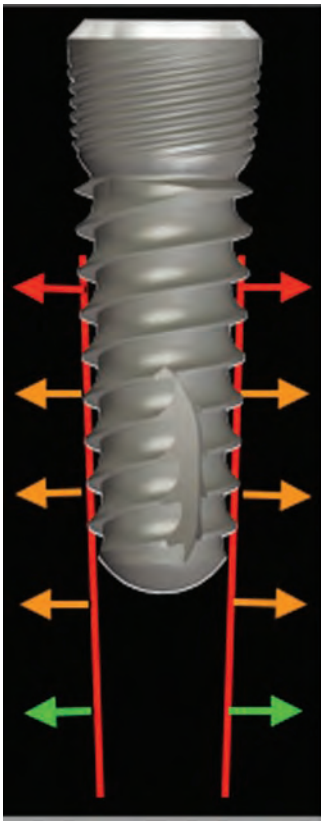


Figure 14. A tapering implant with a pronounced crestal flare placed into a tapering osteotomy will concentrate compression along the entire length and aggressively at the crest. Red = areas of high compression; orange = areas of moderate to high compression; green = areas of moderate compression; yellow = areas of light compression.

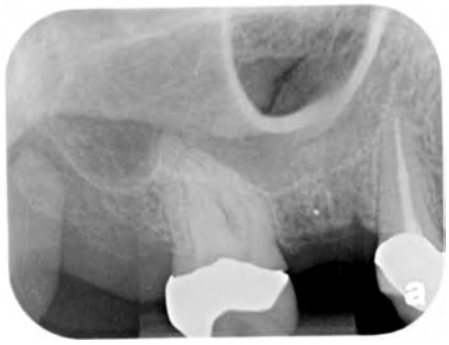


Figure 15. Low antrum, 5 mm vertical bone height.

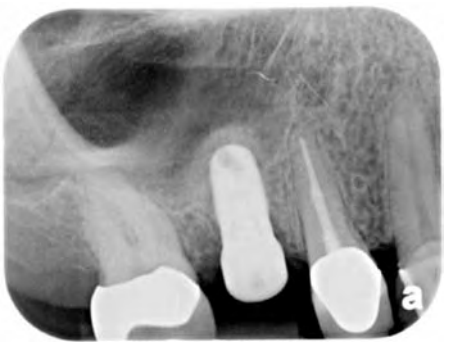


Figure 16. 10 mm implant with crestal augmentation.

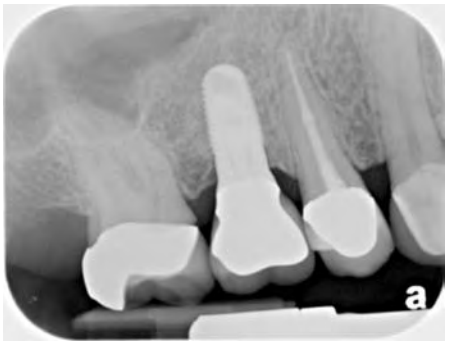


Figure 17. Implant crown at 1 year.

into the antrum (see Figure 5 and Figures 14 to 17).

Conclusions

Initial implant stability to fixate against excessive micro-movements is a primary consideration where immediate implantation is undertaken and particularly if immediate or early loading is contemplated.

Implants with sharp threads and a tapering body when placed into an undersized osteotomy will effectively engage bone by compression of the threads as well as by compression of the implant body wall against the osseous preparation.

Different implant macro-designs will produce different effects on the way bone compression fixation is developed. It is recommended that implant selection should be based according to surgical site specificity requirements.

Conflicts

None declared.

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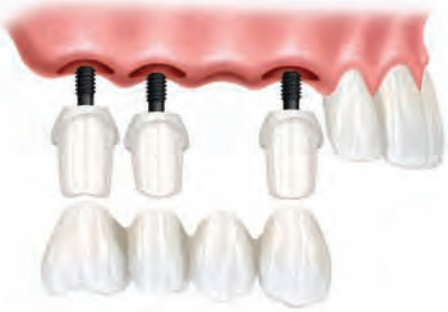

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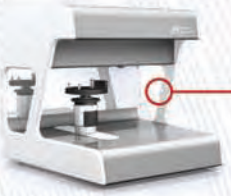

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Effective Business Systems Enhance the Delivery of Quality Dentistry and Will Impact Your Bottom Line! Part II

By Ms. Jo-Anne O'Connor-Webber

My last article in the 2010 winter issue of *CJRDP* left you with three assignments!

No.1 – Creating Your Practice Vision
If you had an opportunity to accomplish this make sure it is within your easy reach.

No. 2 – Leadership and Your Team
It is my hope that you (a) were able to use the criteria provided to complete an initial positive evaluation of your team. This will put you in a solid starting place with incorporating improvements into your practice. And (b) have asked yourself on a regular basis how something in your daily routine could be done better, and encouraged your team to do the same.

No 3 - Assessing Your Systems is illustrated in the box on page 50.

The interconnectedness of these areas can be seen in the following example: In advance of scheduling a *new patient* we have to develop our practice's scheduling guidelines, determine the estimated fee for their initial appointment to allow us to properly inform the patient in advance, put protocols in place to educate the patient on their oral health state and recommended treatment, and identify the practice's specialty leadership team to be collaborated with as necessary.

Although many of the business systems in the dental office are universal, these internal assessments are critical and should be adapted to the individual type and size of practice. I have over the years observed that some personality temperaments view this degree of administrative detail as being optional or just plain uninteresting. Be that as it may, in my experience if these assessments are not properly completed the impact will be pronounced.

IPCA

About the Author

Jo-Anne O'Connor-Webber is the president of IPCA, the developer of "Dental CATALYST Solutions," – which is committed to making business consulting for the dental industry more authentic, more efficient, more cost effective, more dynamic, and less complex. She is also a certified DISC behavioural studies trainer. Over the past 25 years, Jo-Anne has mastered the roles of: business manager, treatment coordinator, software trainer, practice management consultant, and mentor in the specialty and general dental practice.

Since 1984, Jo-Anne has been "hands on" in the prosthodontic, pedodontic, periodontic, orthodontic, and general dentistry practices, She has held integral business roles in practices that provide full mouth rehabilitation, implant placement and restoration as well as laboratory services. Jo-Anne continues to train dental teams on how to effectively educate patients on the benefits of comprehensive dentistry utilizing the case presentations skills taught in her consulting. She can be reached at: Phone: 519-886-6872;
Email: info@dentalcatalystsolutions.com; www.dentalcatalystsolutions.com.

No.3 – Assessing Your Systems

Administrative Systems	Active Patient Management
New Patient Protocols	Patient Finance Management
Case Presentation	Referral Management
Patient Case Acceptance	Lab Case Management
Scheduling	Practice Success Monitors

As you were assessing the above areas did you notice their interconnectedness?

When assessing:	We have to include a thorough review of:
New Patient Protocols	Practice scheduling, case presentation, case acceptance, patient financial, and referral protocols
Active Patient Management	Practice scheduling, case presentation, case acceptance, patient financial, referral, and lab case management protocols.
Patient Case Acceptance	New patient, case presentation, scheduling, patient finance, active patient management, referral and lab case management protocols

Efficient Systems and Effective Systems

Author, Kevin W. McCarthy in his book, *The On-Purpose Person* suggests that efficient means doing things right while effective is doing the right things! In our practices we need to have systems in place which allow us to efficiently and effectively execute our responsibilities on a daily basis.

Practice administrative forms are a tremendous tool in prompting us through our daily tasks. In your dental practice we can divide these forms into two categories (1) patient forms and (2) system forms.

Patient forms, such as those used to obtain personal information and clinical charting forms, assure that we are collecting the required information to properly look after our patient's individual needs.

Intelligently designed system forms such as a new patient checklist and case planning worksheet, walk us through completing our daily tasks and make what we do become routine. The nature of the task becomes less stressful and less time consuming. In essence, with time and practise an individual will be on autopilot with some of the more mundane administrative tasks. These tasks are now accomplished with ease regardless of the individual performing the function. In your dental office this will allow for more time to be spent being attentive to patients and better prepared to handle obstacles which may present themselves during the day.

In his book *The E Myth Revisited*, Michael E. Gerber, says "the system becomes the tools your people use to increase their productivity, to get the job done in the way it needs to be done in order for your business to successfully differentiate itself."

DO YOUR PRACTICE FORMS NEED AN INTELLIGENT MAKEOVER?

Possible Unidentified Inefficiencies in Your Practice

The Patient Chart

I am aware a percentage of offices have computerized patient charts but the majority do not. I have to confess that as much as I am an advocate of technology I remain more confident with relying on a manual patient chart.

I continue to be surprised at the number of offices where I observe individuals wasting time "searching" through the chart and I am sure we have all witnessed a chart being dropped resulting in radiographs and papers flying in all directions. My frustration with these scenarios led me some time ago to collaborate with a manufacturer to design a chart which secures the documents and eases retrieval of necessary information. The old axiom "a filing system is only as good as its ease of retrieval" is as true as ever.

Computer Technology

Is your IT department up to date or at least functioning in the current millennium? Do you have a server separate from the workstations? Does your practice have an adequate number of work stations? Are you using current business software? Does the practice have a daily, offsite back-up? Are the computer work stations designed to be ergonomically friendly? Is at least one person trained in running all reports available in both your dental management and accounting software?

Whether you are running your daily operations with one or 10 computers make sure the above questions have been addressed. In addition I would make absolutely certain that a back-up is being created daily. One practice I was recently working with assured me that a back-up was being performed daily only to discover that it had not been properly backed up in six months. Computer technicians I work with recommend you contract an online service to back up your data off-site because they do not trust the reliability of a tape back-up. You may not be aware there is a problem with your back-up tape until you need to access the data on it only to realize that it is defective. I do not think I need to describe the frustration and the negative impact this may have on your practice. A computer technician recently advised me as to the importance of ensuring that the company providing your off-site back-up service not only confirms that the back-up has been successfully accomplished each day, but has been examined by someone within their company to identify any errors that should be addressed in their infancy. For offices with computerized charting this is process is imperative.

The Internet

Yes, you need to be connected! For many years my message to practices has been to begin collecting patient email addresses and if the practice didn't have Internet access in their facility to consider acquiring it in the near future. Today we know the Internet is an absolute necessity in the majority of businesses. The Internet is a very useful tool whether to order supplies, complete your online back-up as mentioned, or communicate with your patients, team,

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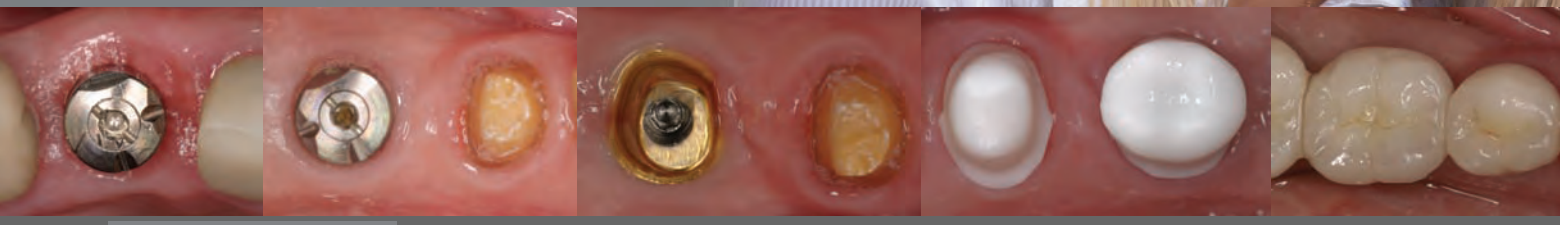

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Telephone System

This seems like a very basic question, but does your phone system have enough lines? If you have a boutique practice with one clinician, two hygienists, and two administrative personnel, I would recommend a minimum of three lines on the main number and a separate private line for doctors and labs to contact you easily. If your fax is phone-line based, I would designate it to the private line.

Do your administrative team have wireless head sets to allow them to write while on the phone and avoid neck strain?

It has been a controversial subject, but some offices are still enforcing the rule of answering the phone by the third ring. Unless you have a person whose sole responsibility is to answer the phone in your practice this rule needs to be modified.

Offices should consider using their answering machine as additional administrative team member. More important than multitasking in our business office today is prioritizing. If you are attending to a patient and there is no one else available to answer the phone, let it go to your voice message. The patient in front of you is the most important person at that moment. Not only is it rude to answer the phone in the middle of assisting another patient, it is also inconsiderate to then put the caller on hold for an indefinite amount of time before you can attend to them. I would recommend that you leave a detailed message informing the caller of the administrative office hours, and that you are currently assisting another patient and request they leave a detailed message providing the reason for their call and an assurance that you will return their call promptly. The key is then to return the call promptly! This format can improve efficiencies by providing the team member an opportunity to gather key information from the caller's message, review their chart and acquire other intelligence before making the return call.

The Comprehensive Examination & Diagnosis: The Prerequisite to Educating Our Patient

Given that this issue of *CJRDP* is a special implant dentistry issue, and my experience since 1989 has included developing, executing, and training on the business systems required to incorporate dental implants into the speciality and general dental practices, I feel it is appropriate to comment on the topic of incorporating implants into your practice.

Throughout my career I have approached the topic of including implants in the dental practice as an excellent opportunity to encourage the practitioner to address the more expansive topic of providing their patients with comprehensive diagnosis and treatment planning. This, followed by educating the patient regarding their current state of their oral health, combined with educating them as to the applicable treatment recommendations, options and the possible outcome of not proceeding with any treatment.

These protocols will assist us in meeting the requirements for patient informed consent. Patient acceptance of comprehensive treatment will allow us to effectively and profitably sequence our appointments to optimize hourly production. Although a patient may not immediately accept the comprehensive treatment plan in its entirety they may chose to either phase their treatment or make the decision to proceed in the future. I think you will agree with me that when our patient does decide to invest in their oral health that you would prefer it is in your office. The fact is if we don't present the treatment option they can't accept it!

Dental implants are an excellent modality of treatment when offered as part of overall patient care. As we more consistently inform the patient as to their available treatment recommendations and options, the delivery of implant-related treatments will naturally increase.

To ensure the patient and the practice realizes the greatest possible benefit from the execution of these protocols these systems must be continually monitored and improved.

Throughout my career as a non-clinical team member I have had the opportunity to collaborate with both restorative specialists and general practitioners in the delivery of information to literally thousands of patients as to their current oral health state as well as treatment recommendations and options. With each patient it was necessary to take the appropriate amount of time to ensure they understood the information provided and answer the questions that routinely surfaced once the clinician left the room. At this stage of the meeting, I would also discuss treatment fees along with financial payment options and proceed with the coordination of their appointments and referrals as necessary.

From these experiences, I feel it is important to share with you the following common remarks, concerns, and questions of patients who have been referred to these offices. Often a patient would not be confident enough or have the opportunity to deliver this message to the clinicians themselves. Our patient's sincerely expressed concerns allow us the opportunity to re-evaluate and clarify our vision as an industry as to where improvement needs to take place.

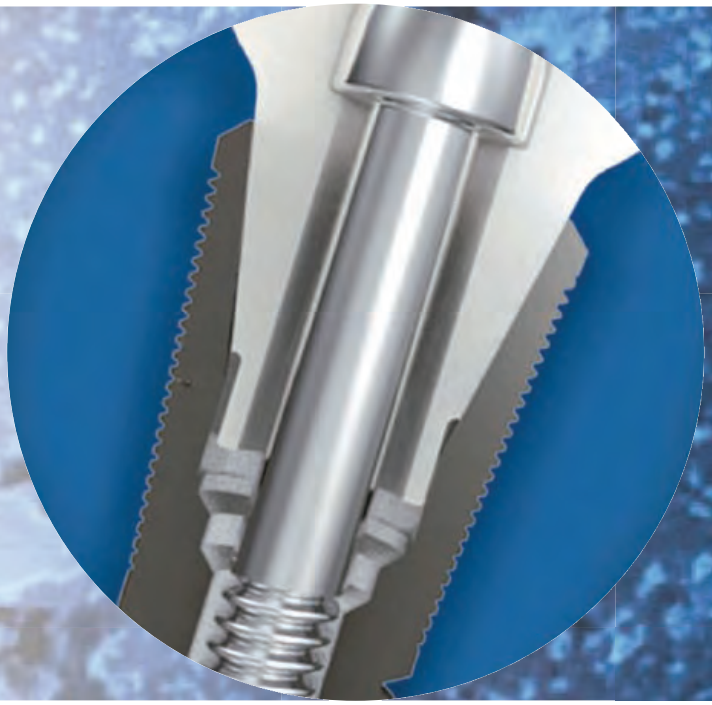
Example # 1: The patient was referred for consideration of replacement of a molar. Following the treatment discussion, the patient indicated the referring dentist had replaced another missing molar with a conventional bridge a few months earlier and at that time she had not been informed of an implant option. The patient also questioned why they had not been referred to the prosthodontist sooner.

Example # 2: The patient had been referred for assessment and possible treatment of a tooth with a large restoration that had fractured. He was subsequently provided with restorative options including an implant-retained prosthesis and other restorative treatments as part of a comprehensive treatment plan. After the treatment discussion, the patient indicated that he had been seeing his dentist for 20 years and had never been informed as to the extent of treatment necessary or been offered this type of treatment option.

It is clear that today's patient is expecting to be advised of their treatment options and to be referred to a specialist when the complexity of the treatment warrants it. The average patient may not be sufficiently educated in this area to request these choices directly of you. We risk having our patient becoming disgruntled with us if they learn what is available to them from other practitioners.

Dental Implant Restorative Residency Program

A comprehensive approach to Dental Implant Continuing Education utilizing the Team Approach to empower participating doctors and their team in building their implant practices.



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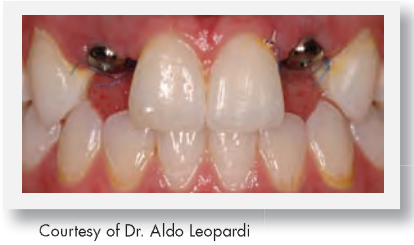
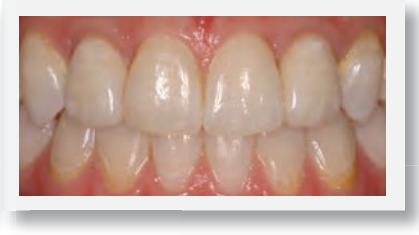
When compared to conventional fixed or removable prosthetic options for tooth replacement, implant therapy is a biologically conservative treatment approach with the potential for achieving rewarding treatment outcomes for both the patient and dentist.

Topics will include:

- Biomechanical and treatment planning considerations
- Hands-on training with implant components
- Fixed restorative considerations
- Removable and complex restorative considerations





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There seems to be an increased desire of individuals to seek options which improve their overall health and/or prevent future health problems. Undoubtedly this growing awareness will continue to spill over into the dental industry as our patients are made aware of the connections between their oral health and overall well-being.

One consistent comment I have heard from clinicians and teams in our industry while discussing ways to increase the acceptance of implant retained prostheses in their practice is that they do not want to "sell" dentistry! My objective in working with a clinician who feels this way is to change their perception that *they are selling* dentistry to an understanding that it is *their professional responsibility to educate the patient* as to their needs and treatment options; there is no selling involved! When a team member expresses this concern it tells us that we need to focus our team training so everyone understands and is confident with the treatment services offered within our practice and the benefits of these treatments to the patient who received them.

Incorporating Implant or Other New Modalities of Treatment

When the appropriate provincial fee guide is reviewed we see that the services provided are divided into categories. The *ODA Fee Guide* lists these services as follows: diagnostic services, preventive services, restorative services, endodontic services, periodontal services, prosthetics-removable, prosthodontic services-fixed, oral and maxillofacial surgery, and orthodontic services. Obviously as professionals we know we do not have the prerogative to ignore sections of the guide because we have chosen not to include those services in our practice.

In a general practice clinicians have a very large menu to serve! Without doubt part of your practice vision includes providing the highest standard of care as well as developing a profitable practice. I'm sure after assessing your own strengths, likes and dislikes you have decided which treatments you will provide in your office and determine the treatments you will refer as appropriate.
Before you make a final decision to incorporate any new modality of treatment into your practice, such as the surgical aspect of implants, I would recommend that you have considered the following:

1. Are all aspects of effective business systems incorporated into your practice and being executed efficiently? Are you *business system* ready?
2. Do you have a trained team member as part of your synergistic business team to assist you with communicating with your patients?
3. Have you identified and written down the objectives you hope to achieve for the patient and the practice through incorporating this additional modality of treatment? Have you shared this with your team?
4. Has a thorough analysis of your practice financials been completed and are you aware of your current average hourly clinical production?
5. Has the professional fee you will charge the patient been determined and a cost/benefit analysis to the practice been completed?
6. Have your practice's current scheduling protocols been reviewed and a new scheduling template created along with a strategy to incorporate these treatments into your schedule?
7. Are there treatments you may need to refer to another practitioner allowing room in your schedule if your schedule is relatively full?
8. Does your practice have the team capacity or will the projected increased profit from the treatment allow you to hire an additional team member who, in the implant scenario, will handle the ordering and tracking of implants as well as setting up and tearing down of the surgical operatory and assist with the surgery?
9. Do you have the appropriate number of operatories to accommodate the treatment set up and tear down procedures to avoid interrupting delivery of other treatments during this process?
10. Have you itemized and determine the estimated financial investment the practice will need to make to address any of the necessary above points, training costs for you and your clinical assistant, the required clinical equipment set up, etc.?

Once you have accomplished the above points you are now ready to research and complete the clinical training you will require. I recommend following your training you review this list again and have a team meeting to outline the details of implementation.

My caution to you is to not start the decision making process with completing the training and purchasing the clinical equipment! Points 1 through 10 must be completed first!

Case Scenario

A general practitioner was considering incorporating the surgical aspect of implants into his practice. The practice already provided the restorative aspect of implant retained crowns and bridges. In addition to providing conventional major restorative treatments, he also offered the treatment of orthodontics in his practice. Following an assessment of the practice the clinician came to realize that he would have to limit the number of orthodontic patients in his practice to incorporate the surgical aspect of implants. The decision was made to not incorporate implant surgery into his practice. We developed a strategy to increase the overall acceptance of treatment in his practice which included a concentrated focus on implant retained prostheses.

Case Acceptance

Where does case acceptance start? Before the new patient exam!

Before our next meeting, consider having each team member provide you with their opinion of the areas in the practice which should be addressed. Ask them to confidentially provide you with their likes, concerns and suggestions.

If you are prepared to grow in your leadership ability and hear your team members "truth statements" ask them to share with you their likes, concerns, and suggestions of you as practice leader. Let them know that you want to grow in your leadership role and that you need to hear their honest feedback!

References

1. McCarthy KW. The On-Purpose Person, Colorado Springs, CO: Piñon Press, 1992.
2. Gerber, ME. The E Myth Revisited, New York NY: HarperCollins, 1995.

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Periodontal Laser Education Proves To Be Popular With Quebec City Audience

Ivoclar Vivadent and Patterson Dental are excited to be teaming up to spread the word about the benefits of using lasers for periodontal treatments. Patterson's Quebec branch hosted an enthusiastic group of 25 area dentists and hygienists in Quebec City this April for a full-day seminar, followed by a live patient hands-on training with the Ivoclar Vivadent Odyssey Navigator diode laser system for soft tissue treatment.

"The theme of the event was Dental Hygiene for the 21st Century," said National Sales Manager Dan Carrington. "Participants learned about periodontal and soft tissue treatments which fall within the dental hygienist scope of practice using the soft tissue diode laser. Janet Press, RDH reviewed these laser applications and how to them incorporate into a more patient-centered practice."

The lecture was presented by Janet Press, RDH from Las Vegas, who made an informative, interactive presentation, which was simultaneously translated into French for the French speaking audience. Press is a dental hygienist with over 31 years of experience, with 12 years clinical experience using soft tissue lasers. She conducts national workshops, private dental office consultation and training programs with emphasis on soft tissue laser dentistry.

"The program was a big hit with our clinicians," said Carrington. "I anticipate a surge in Odyssey Laser periodontal treatments will be implemented in the Quebec City area very soon."

Patterson Dental is a provider of high-technology dental products, operatory equipment, supplies, technical services and office design. Ivoclar Vivadent is a leading producer of laser technology for periodontal treatments and other dental applications.

Dr. Sumita Mitra Announces Her Retirement from 3M Effective

Sumita joined 3M's corporate research laboratory in 1978. In 1983 she became a research specialist with 3M Dental. During the next 27 years, Sumita, and the teams she led, were responsible for multiple new technologies and subsequent successful product introductions within the dental industry. She has become a world renowned scientist, lecturer and author. In 1998 Sumita was inducted into The 3M Carlton Society and promoted to corporate scientist – the highest recognition within 3M Company for a technical employee. Sumita has received in excess of 37 patents. Most recently, in 2009, she received the prestigious "Hero of Chemistry" award from the American Chemical Society. Sumita was responsible for inventing the Vitrebond Co-polymer which enabled the creation of the resin modified glass ionomer category. 3Mt ESPEt RelyXt Luting Cement and RelyXt Luting Plus are the leading products in the category. Sumita was also responsible for developing the first composite restorative material with nanotechnology. 3M ESPE Filtek Supreme Ultra is the latest iteration of the technology. Launched on March 1st of this year, it is receiving outstanding support and commercial success.

Pulpdent Pioneers New Provisional Chemistry

Pulpdent Corporation has introduced Rubberized-UrethaneT, a new category of provisional materials. The breakthrough is the first advance in provisional chemistry in 18 years.

During the past two decades, many practitioners have favoured bis-acrylic provisional materials from Germany over traditional powder and liquid acrylic. Now, Pulpdent has introduced a new provisional chemistry. By inserting a synthetic rubber molecule into a diurethane dimethacrylate molecule, Pulpdent has developed Tuff-TempT, a proprietary rubberized-urethane provisional material with clear advantages over the older technologies.

www.pulpdent.com

Q-OPTICS LAUNCHES FIRST ALL-TITANIUM SPORTS FRAMES FOR DENTAL LOUPES

New Eclipse-Ti frames bridge the gap between style and functionality

Dental loupes have become an indispensable tool for most dentists in their daily practice, as they depend on the improved vision to perform at a higher level, as well as to prevent strain injuries resulting from poor posture.

Until now, dentists have been forced to compromise by having to choose between functionality such as prescription accommodation and durability, and style factors such as fashion and comfort.

The launch of the Eclipse-Ti titanium sports frames is the culmination of a 2-year development effort that utilized feedback from dentists to build a loup that combines all the positive features identified during research: It is a lightweight, comfortable, and stylish wrap-around titanium frame that is purpose designed for dentistry. The Eclipse-Ti incorporates an exclusive quick release mechanism for any strength prescription, and offers a limited lifetime warranty on the frame and optics.

Q-Optics is based in Dallas, TX, and is a wholly owned subsidiary of Quality Aspirators. The Surgical Room is the exclusive Canadian distributor for Q-Optics.

www.q-optics.ca

CARDP
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2010 Annual Scientific Meeting

October 14th - 16th, Calgary, Alberta

Meeting Theme: "Real World Dentistry 2010 and Beyond"

Registration Form - Fax Completed Form to 902-484-6926 or Mail to Address at Bottom

Dr. _____ Mr. _____ Ms. _____ Mrs. _____
First Name: _____
Last Name: _____
Address: _____
City: _____ Province/State: _____
Postal/Zip: _____

Day Phone: _____
Evening: _____
Cell: _____
Fax: _____
Email: _____
Partner/Guest: _____

____ Special dietary requirements - contact me for specifics.

I have registered at the Host Hotel... Yes _____ No _____
I plan to register at the Host Hotel... Yes _____ No _____

Hotel Information: The Westin Calgary
Reservations: visit www.cardp.ca for Westin Reservation Link
(Under Canadian Academy of Restorative Dentistry & Prosthodontics)
Meeting Rate is $195.00 per night + applicable taxes

Conference Rate:

	Early Bird Price	After July 15th
Friday Only	$450.00	$495.00
Full Meeting - Members	$825.00	$875.00
Full Meeting - Non Members	$925.00	$975.00
Life/Honorary - Meals Only	Friday: $150	Full: $325

Conference Status: (please check one)

Attending Friday Only _____
CARDP Active/Fellow Member (Dues Paid) _____ (Rate Waived)
CARDP Active/Fellow Member (Dues Owed) _____ (Rate Applies)
CARDP Life/Honorary Member _____
Non-Member _____
Guest Speaker _____ (Rate Waived)

Please Note:
No refunds after August 1st, 2010

For additional Meeting Info, please visit: www.cardp.ca

Scientific Sessions & Table Clinics

Scientific Sessions - Friday, October 15th: 8:30 am - 5:00 pm
Scientific Sessions - Saturday, October 16th, 8:30 am - 2:00 pm
Table Clinics - Saturday, October 16th, 2:30 pm - 5:30 pm

Scientific and Social Activities

Hands on Course with Mr. Naoki Aiba
Thursday, October 14th
Cost: $ 300.00
Registrant Event _____ ** space is limited*

Horseback Riding
Thursday, October 14th
Cost: $ 225.00 each
Registrant _____ Partner/Guest _____ ** max 8 participants*

Fly Fishing
Thursday, October 14th
Cost: $ 345.00 each ** max 8 participants*
Registrant _____ Partner/Guest _____

Welcome Buffet
Thursday, October 14th
Cost: Complimentary ** please indicate if you plan to attend*
Registrant _____ Partner/Guest _____

Scientific and Social Activities

Partner / Guest Event: Tour, Dine, Shop
Friday, October 15th
Cost: $ 125.00 each
Partner/Guest Event _____

Wild West Night
Friday, October 15th
Cost: $ 175.00 each
Registrant _____ Partner/Guest _____

CARDP Members Luncheon
Saturday, October 16th
Cost: Complimentary for Members
Registrant _____ ** please indicate if you plan to attend*

President's Gala
Saturday, October 16th
Cost: $ 195.00 each
Registrant _____ Partner/Guest _____

Conference Rate: $ _____
Activities: $ _____
Activities: $ _____

Total: $ _____

Credit Card:

Visa _____ Mastercard _____
Name: _____
Card #: _____
Expiry Date: _____ _____

CARDP Journal Authors Awards

Young Authors Award Fund: $ _____
Dental Students Award Fund: $ _____

Mail Form and/or Cheque To:

C/O Conference Managers
2010 CARDP Annual Meeting
PO Box 665, Dartmouth NS B2Y 3Y9

Fax Form To: 902-484-6926

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THE WESTIN CALGARY

Get Meeting Info and Register Online at www.CARDP.ca
The Westin Calgary Hotel Reservations: 1-403-266-1611

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Congrès annuel 2010
14 au 16 octobre, Calgary, Alberta

Thème du congrès: La dentisterie pragmatique: aujourd'hui et au-delà

Inscription - Télécopiez le formulaire complété à (902)484-6926 ou envoyez-le par courrier à l'adresse au bas de ce formulaire.

Dr _____ M. _____ Mme _____
Prénom: _____
Nom: _____
Adresse: _____
Ville: _____ Province/État: _____
Code postal: _____

Téléphone jour: _____
Téléphone soir: _____
Téléphone cellulaire: _____
Téléc.: _____
Courriel: _____
Conjoint/invité: _____

____ Restrictions alimentaires - contactez-moi

J'ai réservé à l'hôtel du congrès: Oui _____ Non _____
Je vais réserver à l'hôtel du congrès: Oui _____ Non _____

Information sur l'hôtel : Le Westin Calgary
Reservations: visitez www.cardp.ca
(Sous la rubrique de l'Académie canadienne de dentisterie restauratrice et de prosthodontie)
Tarif pour le congrès: 149$/nuit + taxes

Tarif du congrès:

	Inscription hâtive :	Après le 15 juillet :
Vendredi seulement	450$	495$
Pleine participation, membres	825$	875$
Pleine participation, non-members	925$	975$
Membre à vie - pour repas	Vendredi 150$	Pleine 325$

Sessions scientifiques et démonstrations cliniques:
Sessions scientifiques - vendredi le 15 octobre: 8h30 - 17h00
Sessions scientifiques - samedi le 16 octobre: 8h30 - 14h00
Démonstrations cliniques- samedi le 16 octobre: 2h30 - 17h30

Statut: (veuillez cocher un des items suivants)

Vendredi seulement _____

Membre actif/Fellow de l'ACDRP (cotisation payée) _____ (tarif exempté)
Membre actif/Fellow de l'ACDRP (cotisation impayée)___ (le tarif s'applique)

Membre à vie/honoraire : Vendredi _____ Pleine _____

Non membre _____
Conférencier invité _____ (tarif exempté)

Avis: Aucun remboursement après le 1er août 2010

Activités scientifiques et sociales

Formation pratique, Mr Naoki Aiba
Jeudi le 14 octobre
Coût: 300$ chacun
Participant inscrit au congrès ____ *l'espace a limité

Équitation
Jeudi le 14 octobre
Coût: 225$ chacun *max. 8 personnes
Participant inscrit au congrès _____ Conjoint/invite _____

Pêche à la mouche
Jeudi le 14 octobre
Coût: 345$ chacun *max. 8 personnes
Participant inscrit au congrès _____ Conjoint/invite _____

Buffet de Bienvenue
Jeudi le 14 octobre
Coût: À titre gracieux *Veuillez indiquer si vous y serez
Participant inscrit au congrès _____ Conjoint/invite _____

Activités scientifiques et sociales

Activité pour conjoint/invité: Tour - Boutiques - Repas
Vendredi le 15 octobre
Coût: 125$ chacun
Conjoint/invité _____

Soirée Western
Vendredi le 15 octobre
Coût: 175$ chacun
Participant inscrit au congrès _____ Conjoint/invite _____

Repas du midi des membres de l'ACDRP
Samedi le 16 octobre
Coût: À titre gracieux pour les membres
Participant inscrit au congrès ____ *Veuillez indiquer si vous y serez

Gala du Président
Samedi le 16 octobre
Coût: 195$ chacun
Participant inscrit au congrès _____ Conjoint/invite _____

Tarif du Congrès : _____$
Activités : _____$
Fonds du JCDRP : _____$

Total: _____ $

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Date d'expiration : _____ _____

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Postez le formulaire avec votre chèque ou renseignements de carte de crédit à:
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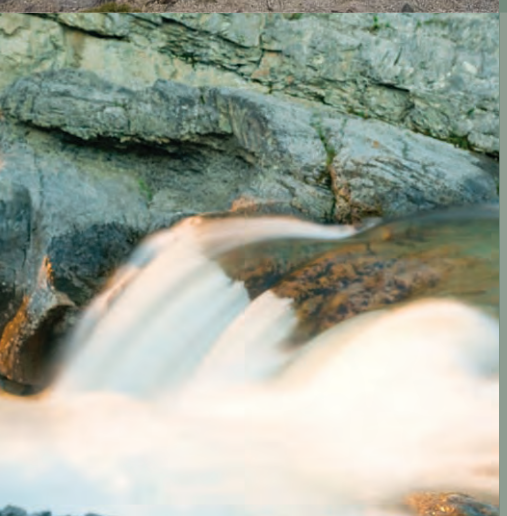

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