Interdisciplinary Treatment Planning, Volume II

Comprehensive Case Studies

Editor

Michael Cohen, DDS, MSD

Affiliate Assistant Professor
Department of Periodontics
University of Washington School of Dentistry
Seattle, Washington

Private practice
Seattle, Washington

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Foreword

Interdisciplinary Treatment Planning, Volume I introduced the dental profession to the Seattle Study Club community and its philosophy and focus on case planning, and it is widely anticipated that this second volume will once again achieve the same extraordinary acceptance and worldwide impact. Demonstrating the need for a detailed comprehensive treatment reference for the general practitioner and the specialist alike, and with a focus on practical case treatment, this second volume explores in further depth the essentials of interdisciplinary planning.

The unique standards set in each chapter are due not only to the astonishing quality of the clinical results displayed by all the authors but also to their strict discipline and coordination with their own respective team members. Once again in this second volume, the enthusiasm and experience of the authors permeate each chapter through their uncompromising commitment to quality dentistry and their knowledge of multiphased treatment, as well as their confidence in the vision and success of the final outcome.

The impact of this landmark text will be felt in private as well as academic settings, where I have watched postgraduate students of various specialties open the first volume in awe and read over chapters in utter amazement. To these specialty residents and general practitioners alike, the first step is to simply acquire the right mind-set and be disposed to seek collaboration with other experts from the start of their careers. The next step is to understand that this collaboration skill will develop as a lifelong endeavor and that it is a professional journey indeed.

Interdisciplinary dentistry should be given priority as early as possible because of the prime importance of diagnosis. This volume greatly elaborates on this topic and devotes considerable attention to the diagnostic phase, and the reader should appreciate the detailed lists of problems outlined in each case presentation and the organized progression that leads to a meticulous diagnosis. It is critical to note that the computation and processing of the data into each treatment sequence is multidisciplinary in nature and pooled from several other specialties, either directly or indirectly. In this fashion, the scope and quality of the diagnosis becomes considerably widened because the clinician becomes acutely aware of the nuances and fine correlations between tooth size, tooth position, gingival levels, occlusal status, implant placement, and periodontal condition.

The ability to collect and correlate the data across the specialties and sequence and coordinate multiphased treatment is a competence that is acquired over time. For many, this journey was made possible through the vision of Michael Cohen, who assembled a number of study clubs structured around one unifying principle: case planning and treatment through a practical team approach. Certainly, a consequence of this approach was the elevation of the quality of dental care in daily practice, and over the years the number of such study clubs has grown exponentially across a multitude of small and large communities nationwide. Most importantly, the foundation of this club community is based on the fact that dental practitioners cannot practice in isolation, and today more than ever, with the explosive growth of implant dentistry, esthetic dentistry, and adult orthodontics, they need to merge their own expertise with that of their team of specialists. While this is a given in an academic setting where access to specialists is within the same building, a study club approach with such a structured forum provides a tailored continuing education program within a "university without walls."

Another key foundation of the Seattle Study Club is the focus on interactive treatment planning as opposed to passive learning. The mutual interaction between the various members leads to the exploration of various treatment options and formulae and defines prognosis along with treatment expectations. In such a setting, the expertise brought by each member—

general practitioners and specialists alike—provides a very unique educational experience, and that process gets repeated on a regular basis with each session and with each new case study. I personally conducted many such seminars with a multitude of Seattle Study Clubs, and I became intimately convinced of the merit of this philosophy as I witnessed over the years the rapid progression of all the groups in their interdisciplinary planning, their comprehensive approach, and their increasing treatment standards and expectations. I can confidently say today that this interactive group learning is a mandatory component for understanding, prescribing, and practicing comprehensive interdisciplinary care.

However, as one becomes increasingly confident in interdisciplinary and multiphased treatment discussions, there is also a greater need for a systematic approach and reference as new levels of understanding and technology are reached. In this respect, this book provides the reader with the in-depth foundation for diagnosis, planning, prognosis, and sequencing that is so critical in treatment today. The clinical results emphasize the importance of a disciplined and comprehensive approach, and to my mind what makes this book so unique is that it depicts with total clarity the mental processes and the treatment philosophies of the authors and master clinicians as they contemplate their options, compute the prognosis, and weave the complex details of each treatment phase. This provides much-needed insight into decision making for tooth preservation, ridge maintenance, strategic extraction, location and number of implants with their impact on the prosthetic design and interimplant papilla levels, crown lengthening as it pertains to tooth proportion, and, conversely, gingival height as it correlates with pink porcelain design, to name a few examples.

The practicality of this textbook, with its real-life clinical situations and its didactic quality, is a reflection of what has made the Seattle Study Club journey beneficial to so many of us.

Gerard J. Chiche, DDS
Thomas P. Hinman Endowed Professor
Director, Esthetics and Implants Center
Medical College of Georgia School of Dentistry
Augusta, Georgia

Introduction & Background

Welcome, and thank you for joining me on this important second journey into interdisciplinary treatment planning. In the mid-1990s, I remember deliberating with fellow faculty members in the Graduate Periodontics Department at the University of Washington School of Dentistry on the most effective ways to synthesize diagnostic patient data into a comprehensive and consequential treatment plan. One school of thought was to work backward. This idea required one to visualize the final treatment outcome first and then use the diagnostic data to devise a plan, in step-by-step fashion, to reach the ultimate destination. Seems simple enough, right? Not so. Given that there are multiple treatment pathways, which do you choose to ensure the most predictable and successful long-term results? There are many opportunities to go astray and get "off track," even if you have the end goal in sight.

Other colleagues insisted that the most effective approach was to gather the initial data and record all that was amiss, then create a list of goals and objectives to "right the wrongs." Ultimately, one could devise a planned sequence of steps in treatment to meet each of the goals and objectives.

Following spirited discussion, it became apparent to all that an integration of the two methods was not only most ideal but indeed essential in designing an effective course of treatment. The clinician must be able to visualize the desired outcome from the outset to establish the treatment target and to set realistic patient expectations. At the same time, he or she must be able to use effective investigative skills to uncover the problems, generate ideas to resolve the problems, and then establish predictable pathways to make those ideas become a reality.

It is unfortunate that many clinicians treatment plan cases on "auto-pilot." They yield to "pre-set" thinking and solutions, reverting to what has worked well in the past in order to save time and move forward with treatment as expeditiously as possible. Although this time-saving approach may be compatible with the wishes of both the dentist and the patient, it is not always in the *best interests* of all concerned. To my way of thinking, this method of treatment planning is no more than "convenience engineering." It undermines the very essence of what makes the practice of dentistry so unique, eliminating the curiosity and intrigue associated with investigating all potential origins of the present pathology or disease. Not only does it remove the need to do more than just put the pieces of the treatment puzzle together so that they fit, but it also preempts the opportunity to move the pieces around until they actually fit better. Finally, it erodes the creativity and innovation within us as our thinking becomes more routine, resulting in monotony and the loss of passion for what we do.

Concept

I have always subscribed to the thinking that becoming skilled at anything takes not only commitment and focus, but also practice, practice, and more practice. In the best-selling book *Outliers*, by Malcolm Gladwell (Little, Brown, 2008), the author cites multiple studies substantiating that this is more than just one's personal opinion.

"The idea that excellence at performing a complex task requires a critical minimum level of practice surfaces again and again in studies of expertise. In fact, researchers have settled on what they believe is the magic number for true expertise: ten thousand hours."[1]

Gladwell quotes Dr Dan Levitin, a well-respected neurologist, as follows:

> The emerging picture from such studies is that ten thousand hours of practice is required to achieve the level of mastery associated with being a world-class expert in anything. In study after study, of composers, basketball players, fiction writers, ice skaters, concert pianists, chess players, master criminals, and what have you, this number comes up again and again . . . It seems that it takes the brain this long to assimilate all that it needs to know to achieve true mastery.[1]

In the first volume of *Interdisciplinary Treatment Planning* (2008), I maintained that for almost every case there are multiple treatment plans that will provide both clinical predictability and patient satisfaction in achieving a high level of success; this has been borne out empirically in my practice over the years. And yet I cannot emphasize more the assertion by Dr Morton Amsterdam that, although there may be multiple treatment options, there is only one correct diagnosis. The closer we come to accurately determining this diagnosis, the more successful the treatment outcome will be. Treatment planning is not magical or mystical. It is clearly a skill that can be mastered with increased knowledge, understanding, and experience.

The core and essence of Volume I was to pave the way to a higher level of proficiency in case planning by introducing and illustrating essential principles employed by master clinicians in their quest for case predictability and perfection. Each contributor's chapter concluded with a thought-provoking treatment-planning case for the reader to tackle, testing his or her true understanding of the principles introduced in that chapter.

Now comes a vital and indispensable step in improving one's treatment-planning skills: learning through repetition. The more cases one plans, the more proficient one becomes at treatment planning. This is what Volume II is all about. Although each case presents its own set of unique challenges, there are common threads between cases that stand out as primers to improving one's treatment-planning ability. These include:

- *The discipline of establishing a sound rationale for each and every step one plans to take in treatment*

This is not an easy task. It requires undivided attention and a time commitment that many clinicians are not willing to accept. However, sitting down and carefully working out even the most minute of treatment details, planning not only for success but also for potential setbacks during the course of therapy, and creating predictable strategies for recovery should anything ever fail provide the essential foundation for interdisciplinary team treatment success.

- *The understanding that every case should be approached as if the clinician has never treatment planned or treated a case before*

Each case is unique. What has worked in the past may not be successful at present or carry us predictably into the future. It is when we automatically default to what seems "tried and true" that we can be lulled into unexpected, unwanted outcomes or even failure. Once our biases and preconceived notions are eliminated from the planning process, we are more likely to focus on the unique circumstances present in a particular case and appropriately customize treatment strategies.

- *The conviction that treatment planning is optimally managed in partnership*

As I see it, when we treatment plan in isolation we are limited by our own weaknesses. No matter how skilled the clinician, imperfection is an everyday reality. The great basketball coach Pat Riley has said that "great teamwork is the only way we create the breakthroughs that define our careers." A collaborative team environment fosters unparalleled treatment outcomes.

Collaboration is the core and essence of the Seattle Study Club. It is the foundation of interdisciplinary treatment planning and brings individuals together to draw on each other's strengths. It provides a great opportunity to gain a better overall understanding of dentistry and to predictably improve one's treatment-planning skills. Ultimately, the patient is the beneficiary.

Case planning and practicing in isolation may have been possible 20 years ago, but the contemporary dentist recognizes that there is too much at stake and too much to know to go it alone.

I have always looked at the Seattle Study Club as a "university without walls"—a place where we can find all of the resources we once had in our dental school training. We are all perpetual students after graduation, and the study club is where we can most predictably grow. This is a true interdisciplinary environment where we can draw on the greatest resource that we have in our communities—each other! The idea is that everyone learns from each other to make life easier and to take the stress out of case planning and troubleshooting. If you are not taking advantage of this and working in an interdisciplinary team, you are not benefiting from the greatest asset that a club has to offer you.

Collaboration can open your horizons to many treatment options that you may never have thought of, and some of these options may fit your patients' desires better than anything you may think of presenting. Ultimately, this may be the reason that your patients accept treatment that they would otherwise have rejected. In addition, there seems to be more credibility in the eyes of patients when a team of experts is consulting and collaborating on their case. We have seen this in live treatment-planning sessions. Patients who participate in these sessions are more likely to follow through with treatment.

Interdisciplinary Treatment Planning

Volume II offers 19 new challenging treatment-planning cases. Eleven of the authors who participated in Volume I have contributed cases for this new endeavor. In addition, nineteen outstanding clinicians have been added for this project. All of the contributors were asked to follow a standardized format in developing their sections.

1. They were asked to explain why they chose their particular case for the reader to treatment plan.
2. They were asked to offer suggestions about what they thought the reader should focus on in designing his or her treatment plan.
3. They were asked to then present their case in the same format utilized in Volume I.

The treatment-planning cases are presented in two parts using the *Seattle Study Club Journal* format. Part 1 is entitled "Clinical Treatment Planning" and includes all of the diagnostic information needed by the reader to treatment plan the case. At the end of this part, there is an opportunity for the reader to pause and actually do so.

Part 2 is entitled "Active Clinical Treatment" and includes a complete narrative of all of the treatment rendered accompanied by the treatment and posttreatment images and radiographs.

In Volume II, all contributors were asked to provide an expanded "commentary" section at the end of "Active Clinical Treatment." This section includes editorial comments such as how

the clinician would alter treatment if given the opportunity to begin again. What would they do differently this time around? It also contains any additional thoughts on treatment that they would like to share with the reader. Finally, it includes additional details on the philosophy, concepts, and techniques behind the treatment rendered.

Posttreatment Overlays

In Volume I, pre- and posttreatment chartings were presented on different pages within each treatment-planning exercise. This made it somewhat difficult to compare pre- and posttreatment.

In this volume, we have made the process easier by providing a posttreatment transparency for each case, which can be found in the folder included with your book. The posttreatment transparency may be superimposed over the pretreatment charting for comparison purposes.

Michael Cohen

Dr Cohen received his DDS degree from McGill University in Montreal and his MS degree and certificate in periodontics from the University of Washington School of Dentistry, where he now serves as a visiting assistant clinical professor in the Department of Periodontics. He has authored numerous articles on continuing education and is the editor of *Interdisciplinary Treatment Planning: Principles, Design, Implementation* (Quintessence, 2008). For the past 25 years, Dr Cohen has lectured nationally and internationally on the topic of comprehensive treatment planning, and he maintains a private practice limited to periodontics and implants in the Seattle area.

The Seattle Study Club is the brainchild of Dr Cohen. An advanced educational organization, the Seattle Study Club consists of clinicians dedicated to raising the level of practice within their profession. This "university without walls" has more than 6,500 members in approximately 250 chapters in the United States, Canada, Australia, Germany, Spain, Taiwan, and Great Britain. Each club provides clinical treatment-planning sessions designed to increase total case management, problem-solving sessions, a faculty of specialists, and dedicated comprehensive treatment planning. National lecturers are showcased in small group settings, allowing intimate sharing of state-of-the-art treatment for the patient. The Seattle Study Club also publishes a quarterly interdisciplinary treatment-planning journal (*The Seattle Study Club Journal*) and sponsors lectures, conferences, and symposia. Guidance and assistance is also provided to each of the locally based study clubs.

The Master Clinicians

Nitzan Bichacho

Dr Bichacho is a professor of prosthodontics and head of the Ronald E. Goldstein Center for Aesthetic Dentistry and Clinical Research in the Department of Oral Rehabilitation at the Hadassah Medical Campus, Faculty of Dental Medicine, Hebrew University, Jerusalem, the institution from which he graduated in 1984. He is a past president and an active member of the European Academy of Esthetic Dentistry and serves on editorial boards of international professional publications. He is the recipient of numerous international awards for his outstanding professional achievements and contributions to oral health around the globe. Dr Bichacho conceived of and coinvented the NobelActive Implant System, and he lectures worldwide on topics in the fields of dental implant therapy, esthetic oral rehabilitation, and fixed prosthodontics, focusing on innovative treatment modalities and clinical techniques. In his private practice in Tel Aviv, he collaborates with multinational colleagues and dental technicians of world renown.

Marcelo A. Calamita

Dr Calamita received his DDS degree from the University of São Paulo, Brazil. He then obtained his certificate, MSD, and PhD in prosthodontics from the same university, where he also worked as a clinical instructor in the Department of Prosthodontics for 17 years. He has also served as an associate professor of prosthodontics at the University Braz Cubas and at the University of Guarulhos, both in São Paulo. He is currently the president of the Brazilian Academy of Aesthetic Dentistry and maintains a full-time private practice focusing on comprehensive restorative and implant dentistry. He has lectured, published articles, and coauthored book chapters on interdisciplinary treatment planning, implants, and esthetic dentistry.

Murilo Calgaro

Mr Calgaro graduated from the School of Dental Technicians, Senac São Paulo, in 2002. He also attended the Ceramic Specialization Program directed by Dr Paulo Kano at the PK Institute Training Centre, where he then became an instructor. In 2005, Mr Calgaro opened a private training center, Studio Dental, in Curitiba, Brazil. In 2007, he was invited by Dr Christian Coachman to be part of the ceramist team at Dr Eric Van Dooren's clinic in Antwerp, Belgium, where he is now the Master Ceramist. He is also the Master Ceramist for Fabio Fujiy's clinic in Campinas, Brazil, and has been working with many leading dentists around the world such as Mauro Fradeani, Nitzan Bichacho, Galip Gürel, and Sidney Kinna. He is a member of the Brazilian Academy and Society of Esthetic Dentistry.

Yen-Wei Chen

Dr Chen received his DDS degree from Taipei Medical University in Taiwan and his MSD degree and certificate in prosthodontics from the University of Washington School of Dentistry. He is an affiliate assistant professor in the Graduate Prosthodontics Program at the University of Washington and also maintains a private practice limited to prosthodontics in Seattle. Dr Chen has authored articles on the subject of esthetic dentistry and has lectured both nationally and internationally.

Stephen J. Chu

Dr Chu is an associate professor in the Department of Prosthodontics, the director of Graduate and Undergraduate Aesthetic Education, and a codirector of the Implant and Aesthetic Continuums at Columbia University School of Dentistry. He has published 23 articles and given over 100 lectures nationally and internationally on the topics of esthetic, restorative, and implant dentistry. Dr Chu is a coauthor of *Fundamentals of Color: Shade Matching and Communication in Esthetic Dentistry* (Quintessence, 2011) and *Aesthetic Restorative Dentistry: Principles and Practice* (Montage Media, 2008), and he serves on the editorial review boards of several dental journals and publications. He is the creator of Chu's Aesthetic Gauges and maintains a private practice limited to fixed prosthodontics in New York City.

Christian Coachman

Dr Coachman earned degrees in dentistry and dental technology from the University of São Paulo in 2002 and in 1995, respectively. He attended the Ceramic Specialization Program directed by Dr Dario Adolfi at the Ceramoart Training Centre, where he then became an instructor. In 1996, he opened his own laboratory and also worked as a technical consultant of Creation, Willi Geller Ceramics. In 2004, Dr Coachman was invited to become the head ceramist of the laboratory of Goldstein, Garber, and Salama, a position he held for more than 4 years. Dr Coachman currently works as a consultant and develops products for companies across the globe. He has lectured and published internationally in the fields of esthetic dentistry, oral rehabilitation, dental ceramics, and implants. He is a member of the Brazilian Academy and Society of Esthetic Dentistry.

George Duello

Dr Duello earned his dental degree from the University of Missouri–Kansas City (UMKC) School of Dentistry in 1979. He completed residency training in periodontics and received a master's degree in oral biology from the UMKC School of Dentistry in 1981. He then served in the US Air Force at MacDill Air Force Base in Tampa, Florida, as chief of Periodontics from 1981 to 1983. Dr Duello was named a diplomate of the American Board of Periodontology in 1987, and he is a member of several professional societies and associations. He is a past president of both the Missouri Society of Periodontists and the Greater St Louis Dental Society and an alumnus of the Schuster Center for Professional Development, and he currently serves as the director of the Gateway Study Club, a chapter of the Seattle Study Club in St Louis. Dr Duello has lectured nationally and internationally on contemporary periodontal and implant therapy as well as on practice management, and he has authored articles on dental implant therapy. He is also a member of the Nobel Biocare NobelKnowledge website faculty.

Stefano Gracis

Dr Gracis received his DMD degree in 1986 from the University of Pennsylvania and in 1987 from the University of Pavia in Italy. In 1990, he obtained a certificate in prosthodontics with an MSD degree from the University of Washington under the guidance of Dr Ralph Yuodelis. He then returned to Milan, Italy, where he maintains a private practice limited to prosthodontics and restorative dentistry. From 1998 to 2004, he was a guest lecturer at the University of Parma. He is an active member of both the European Academy of Esthetic Dentistry and the

Italian Academy of Prosthetic Dentistry, for which he was president from 2007 to 2008. He serves on the editorial boards of the *International Journal of Prosthodontics*, *European Journal of Esthetic Dentistry*, and *European Journal of Oral Implantology*. He has contributed several articles and two book chapters in the field of restorative dentistry and is a frequent lecturer on topics related to fixed and implant prosthodontics.

Galip Gürel

Dr Gürel earned his dental degree from the University of Istanbul Dental School in 1981. He continued his education at the University of Kentucky Department of Prosthodontics and received his MSc degree from the University of Yeditepe in Istanbul. Dr Gürel is the founder and honorary president of the Turkish Academy of Aesthetic Dentistry, president of the European Academy of Esthetic Dentistry, a member of the American Society for Dental Aesthetics, and an honorary diplomate of the American Board of Aesthetic Dentistry. He is the editor-in-chief of *Quintessence Magazine* in Turkey, is on the editorial boards of several dental publications, and is the editor of *The Science and Art of Porcelain Laminate Veneers* (Quintessence, 2003). He lectures internationally on dental esthetics and maintains a private practice limited to esthetic dentistry, with a team of specialists and laboratory technicians, in Istanbul.

Jim Janakievski

Dr Janakievski received his DDS degree from the University of Toronto, after which he completed a residency in general practice. After several years in general practice, he completed his postgraduate training at the University of Washington, where he received a certificate in periodontology with an MSD degree and a fellowship in prosthodontics. He is a diplomate of the American Board of Periodontology, serves as an affiliate assistant professor in the Department of Periodontology at the University of Washington, and maintains a private practice in Tacoma, Washington.

Greggory A. Kinzer

Dr Kinzer received his DDS degree in 1995 and an MSD and certificate in prosthodontics in 1998 from the University of Washington. Dr Kinzer currently serves as an affiliate assistant professor in the Graduate Prosthodontic Program at the University of Washington School of Dentistry. From 1998 to 2009, he taught with Dr Frank Spear at the Seattle Institute for Advanced Dental Education, prior to joining the Spear Education faculty in Scottsdale, Arizona. Dr Kinzer has written numerous articles and chapters and serves on the editorial review boards of various dental publications. He maintains a private practice in Seattle limited to comprehensive, restorative, and esthetic dentistry.

John C. Kois

Dr Kois received his DMD degree from the University of Pennsylvania School of Dental Medicine and a certificate in periodontal prosthodontics with an MSD degree from the University of Washington School of Dentistry. He maintains a private practice limited to prosthodontics in Tacoma and Seattle and is an affiliate professor in the Graduate Restorative Program at the University of Washington. Dr Kois lectures nationally and internationally, is a reviewer

for many journals, and is the editor-in-chief of the *Compendium of Continuing Education in Dentistry*. He is the recipient of the 2002 Saul Schluger Memorial Award for Clinical Excellence in Diagnosis and Treatment Planning, and he received a Lifetime Achievement Award from both the World Congress of Minimally Invasive Dentistry and the American Academy of Cosmetic Dentistry. He is a past president of both the American Academy of Restorative Dentistry and the American Academy of Esthetic Dentistry and is a member of numerous other professional organizations. In addition, Dr Kois is the founder and director of the Kois Center, a didactic and clinical teaching program for restorative dentists.

Vincent O. Kokich, Jr

Dr Kokich received his dental degree from Tufts University and his master's degree in orthodontics from the University of Washington, where he teaches part-time as an affiliate assistant professor in the Department of Orthodontics. He received the Charles L. Pincus Research Award for Clinical Research from the American Academy of Esthetic Dentistry, and his current research and publications are primarily involved with esthetic interdisciplinary dentistry. He is a diplomate of the American Board of Orthodontists and a member of the Angle Society and the American Academy of Esthetic Dentistry. Dr Kokich has lectured nationally and internationally on interdisciplinary dentistry and dental esthetics, emphasizing comprehensive treatment planning and the importance of properly sequencing orthodontic, periodontal, and restorative treatment. He maintains a private practice limited to orthodontics in Tacoma, Washington.

Vincent G. Kokich, Sr

Dr Kokich is a professor in the Department of Orthodontics at the University of Washington. In 2010, he retired from his private practice limited to orthodontics in Tacoma, Washington. He has published 21 book chapters, 99 scientific articles, and 48 review articles, has given over 900 presentations worldwide, and has lectured to the orthodontic societies in over 50 different countries. Dr Kokich is the recipient of numerous distinguished awards for his contributions to dentistry, including the Saul Schluger Award in 2000 and the 2008 Charles English Community Education Award for Excellence in Teaching. He has been elected to Fellowship in the American College of Dentists, the Royal College of Surgeons of England, and the Royal College of Surgeons of Edinburgh. Dr Kokich is also the editor-in-chief of the *American Journal of Orthodontics and Dentofacial Orthopedics*.

Glenn D. Krieger

Dr Krieger graduated from dental school in 1992. Nine years later, the Academy of General Dentistry awarded him with Fellowship. He has been a member of the Seattle Study Club for over 10 years, teaching other dentists about comprehensive dental care and the latest advances in esthetic dentistry through lectures and presentations. He has twice earned a designation as one of the top 100 clinicians in continuing education by *Dentistry Today*. Dr Krieger serves as a restorative advisor to Great Blue Heron Seminars and the Renaissance Study Club, both of which are affiliates of the Seattle Study Club, and he is also the former clinical editor of *The Seattle Study Club Journal*.

Cobi J. Landsberg

Dr Landsberg graduated from the Faculty of Dental Medicine at the Hebrew University at Hadassah, Jerusalem, in 1978, and from specialized study in periodontics at Boston University in 1984. He has been a diplomate of the American Board of Periodontology since 1992. Dr Landsberg is a former chairman of the Israel Periodontal Society and is currently an instructor of periodontics in the Specialized Study Program at the Department of Periodontology, Faculty of Dental Medicine, Hebrew University. Dr Landsberg has published numerous scientific and clinical articles on periodontology and implant dentistry in the international dental literature and has lectured extensively in Israel and abroad. He is currently a member of the editorial board of *Clinical Implant Dentistry & Related Research*. Dr Landsberg maintains a private practice limited to periodontics and implant dentistry in Tel Aviv, Israel.

Sonia S. Leziy

Dr Leziy received her dental degree from McGill University in Montreal and her postgraduate degree in periodontics from the University of British Columbia, Vancouver, Canada, where she is an associate clinical professor and sessional lecturer. Dr Leziy is a fellow of both the Royal College of Dentists of Canada and the International Congress of Oral Implantologists, as well as a member of the British Columbia Society of Periodontists, the Canadian Academy of Periodontists, the American Academy of Periodontists, and the American Academy of Esthetic Dentistry. *Dentistry Today* has recognized her as one of the top 100 clinicians in continuing education in North America for the last 4 years. She has published on the topics of implant esthetics and surgical protocols and lectures internationally on implants, advanced esthetics, and periodontal plastic surgery. Dr Leziy maintains a full-time private practice in the Imperio Group Dental Health Specialists with Drs Brahm Miller (prosthodontist) and Priscilla Walsh (periodontist).

Siegfried Marquardt

Dr Marquardt graduated from the Ludwig-Maximilians-University in Munich in 1994. He has been in private practice for over 14 years in Tegernsee, Germany, specializing in periodontology, implantology, perioprosthetics, and esthetic dentistry. Dr Marquardt is the founder and CEO of the Z.a.T. Fortbildungs GmbH, which organizes and promotes international dental symposia and practical courses. In 2001, he was certified as the first specialist for esthetic dentistry in Germany by the German Association of Aesthetic Dentistry and was certified as a specialist for implantology by the European Dental Association. Dr Marquardt lectures internationally and has published articles on the topics of perioprosthetics, esthetic dentistry, and implantology. He is a member of the American Academy of Periodontology and an affiliate of the European Academy of Esthetic Dentistry, as well as a member of numerous other national and international specialist organizations. He holds professorships at the German Academy of Practice and Sciences and the Carl Zeiss Academy in Zürich. Dr Marquardt is the vice president of the German Academy of Esthetic Dentistry and the chairman of the committee for certificates and specialists. He is also the president-elect of the International Federation of Esthetic Dentistry World Meeting 2013 in Munich.

Brahm A. Miller

Dr Miller received his dental degree from McGill University in Montreal and completed his postgraduate prosthodontics certification at the Medical College of Virginia. He is a fellow and examiner of the Royal College of Dentists of Canada, a member of the Association of Prosthodontists of Canada and the British Columbia Society of Prosthodontists, and a past president and fellow of the International Congress of Oral Implantologists. Dr Miller is an associate clinical professor and sessional lecturer at the University of British Columbia. He is a member of several editorial boards, lectures extensively internationally, and has published on the topics of ceramics and advanced implant esthetics and restoration. *Dentistry Today* has recognized Dr Miller among the top 100 clinicians in continuing education in North America for the past 4 years. He maintains a full-time private practice in the Imperio Group Dental Health Specialists with periodontists Drs Sonia Leziy and Priscilla Walsh.

Ricardo Mitrani

Dr Mitrani received his DDS degree from the Unitec University of Mexico City; he then obtained a certificate in prosthodontics as well as an MSD from the University of Washington, where he served as the assistant director of the Graduate Prosthodontics Program in 2001. He currently holds academic affiliations at the University of Washington, University of Valencia in Spain, and National University of Mexico. He is a member of the International College of Dentists, American Academy of Esthetic Dentistry, American College of Prosthodontics, and American Academy of Fixed Prosthodontics. He also serves on the editorial board of the *Journal of Esthetic and Restorative Dentistry*. Dr Mitrani has authored numerous scientific publications and chapters in the fields of implant prosthodontics and esthetic dentistry and has lectured extensively internationally; he maintains a private practice limited to prosthodontics and implants in Mexico City.

Tal Morr

Dr Morr received his DMD degree from Tufts University School of Dental Medicine. He then completed a 3-year postgraduate prosthodontic program at the University of Washington School of Dentistry, where he received a certificate in prosthodontics and an MSD degree. Dr Morr currently maintains a private practice dedicated to esthetics and complex prosthetic reconstruction. He has lectured both nationally and internationally and has published articles on topics such as esthetic dentistry, complex prosthetic rehabilitation, porcelain laminate veneers, and implants. He is also a member of numerous professional organizations such as the American College of Prosthodontists, the American Academy of Esthetic Dentistry, and the American Academy of Restorative Dentistry.

Henry I. Nichols

Dr Nichols graduated from Northwestern University Dental School in 1978. Following graduation, he participated in a general practice residency program. Dr Nichols went on to complete a 3-year advanced training program in restorative dentistry at the University of Washington, which led him to focus his practice on complex restorative dentistry. Dr Nichols lectures nationally and internationally on interdisciplinary treatment planning with an emphasis on

long-term efficacy. He is a contributing author of the text *Interdisciplinary Treatment Planning: Principles, Design, Implementation* (Quintessence, 2008) and also serves as a restorative advisor for the Olympic Peninsula Study Club and Great Blue Heron Seminars. Dr Nichols maintains a private practice in Port Townsend, Washington.

Robert "Tito" Norris

Dr Norris received his dental degree from the University of Texas Health Science Center (UTHSC) at San Antonio Dental School. He completed a general practice residency at the Veterans Administration Hospital in Washington, DC, followed by a residency in orthodontics at Howard University. Dr Norris then served in the US Air Force for 3 years as chief of Orthodontics at Misawa Air Base in Japan. He has lectured throughout the United States and Asia and taught as a clinical associate professor at the UTHSC. His scientific papers have been published in the *American Journal of Orthodontics and Dentofacial Orthopedics* and in *Clinical Impressions and Orthodontic Products*. He is a member of 10 different professional dental and orthodontic associations and a diplomate of the American Board of Orthodontics.

Ariel J. Raigrodski

Dr Raigrodski is a professor and director of Graduate Prosthodontics in the Department of Restorative Dentistry at the University of Washington. He is a graduate of the Hebrew University in Jerusalem and received his certificate in prosthodontics at Louisiana State University School of Dentistry, where he also completed a fellowship in implants and esthetics and earned an MS degree. Dr Raigrodski is a member of the editorial review boards of the *Journal of Esthetic and Restorative Dentistry*, the *Journal of Prosthodontics*, and the *Journal of Prosthetic Dentistry*. He is a diplomate of the American Board of Prosthodontics, a fellow of the American College of Prosthodontists and the International College of Dentists, and a member of the American Academy of Fixed Prosthodontics and other professional organizations. Dr Raigrodski's research is mainly clinical and focuses on all-ceramic restorations, dental implants, and CAD/CAM technology. He lectures both nationally and internationally and maintains a private practice in Kenmore, Washington.

J. William Robbins

Dr Robbins is a clinical professor in the Department of General Dentistry at the University of Texas Health Science Center (UTHSC) at San Antonio Dental School. He graduated from the University of Tennessee Dental School in 1973, after which he completed a rotating internship at the Veterans Administration (VA) Hospital in Leavenworth, Kansas, and a 2-year general practice residency at the VA Hospital in San Diego, California. Dr Robbins has published over 80 articles, abstracts, and chapters on a wide range of dental topics and has lectured worldwide. He also maintains a full-time private practice. He is a coeditor of the textbook *Fundamentals of Operative Dentistry – A Contemporary Approach* (Quintessence, 2006). He has won several awards, including the Presidential Teaching Award at the UTHSC, the 2002 Texas Dentist of the Year Award, and the 2003 Honorary Thaddeus V. Weclew Fellowship Award from the Academy of General Dentistry. He is a diplomate of both the Federal Services Board of General Dentistry and the American Board of General Dentistry, for which he also served as president, and a member of numerous professional organizations.

Anthony G. Sclar

Internationally considered a leader in reconstructive and esthetic dental implant surgery, Dr Sclar has been in private practice at South Florida OMS since 1989. He founded Integrated Seminars and the Sclar Center for Empowered Dental Implant Learning, where he conducts limited-attendance courses for his colleagues using unique teaching methodologies. In addition to publishing numerous journal articles and textbook chapters, Dr Sclar is the author of the textbook *Soft Tissue and Esthetic Considerations in Implant Therapy* (Quintessence, 2003). He also serves as an editor for the dental implant section of the *Journal of Oral and Maxillofacial Surgery* and as an adjunct professor and director of Clinical Research and Post Graduate Dental Implant Surgery in the Department of Oral and Maxillofacial Surgery at Nova Southeastern University College of Dental Medicine.

Ward M. Smalley

Dr Smalley is a prosthodontist and orthodontist who maintains a private practice limited to orthodontics in Seattle. He received his DDS degree in 1977, earned a certificate in fixed prosthodontics and an MSD degree in 1984, and earned a certificate in orthodontics and a second MSD in 1986, all at the University of Washington. He currently serves as an affiliate professor at the University of Washington School of Dentistry in the departments of Orthodontics, Periodontics, and Restorative Dentistry, and he also teaches part-time at the Kois Center in Seattle.

Dennis P. Tarnow

Dr Tarnow is a clinical professor of periodontology and the director of Implant Education at Columbia School of Dental Medicine. He is a former professor and chairman of the Department of Periodontology and Implant Dentistry at New York University College of Dentistry. Dr Tarnow holds certificates in periodontics and prosthodontics and is a diplomate of the American Board of Periodontology. He is a recipient of the Master Clinician Award from the American Academy of Periodontology and of the Teacher of the Year Award from New York University. Dr Tarnow maintains a private practice in New York City and has been honored with a wing named after him at New York University College of Dentistry. He has published over 100 articles on perioprosthodontics and implant dentistry, is the coauthor of three textbooks, including *Aesthetic Restorative Dentistry: Principles and Practice* (Montage Media, 2008), and lectures extensively in the United States and abroad.

Eric Van Dooren

Dr Van Dooren attended the Katholieke Universiteit Leuven in Belgium, where he received his dental degree in 1982. He maintains a private practice in Antwerp, Belgium, limited to periodontics, fixed prosthodontics, and implants. Dr Van Dooren is an active member of the European Academy of Esthetic Dentistry. In addition, he is a member of the editorial staff of both *Teamwork* (Germany) and the Belgian Dental Society. Dr Van Dooren lectures nationally and internationally, mainly on the topics of esthetics, implants, and esthetic periodontal surgery. He has published several articles in international journals and is a contributing author to *The Art of the Smile* (Quintessence, 2005).

John D. West

As founder and director of the Center for Endodontics, Dr West continues to be recognized as one of the premier educators in clinical and interdisciplinary endodontics. He received his DDS degree in 1971 from the University of Washington, where he is an affiliate associate professor. In 1975, he received his MSD in endodontics at Boston University Henry M. Goldman School of Dental Medicine, where he is a clinical instructor and recipient of the Distinguished Alumni Award. Dr West is a contributing author to several books, including *Pathways of the Pulp* (Mosby, 1998) and *Interdisciplinary Treatment Planning: Principles, Design, Implementation* (Quintessence, 2008). He is a past president of both the American Academy of Esthetic Dentistry and the Academy of Microscope Enhanced Dentistry, and he is also a member of the Northwest Network for Dental Excellence and the International College of Dentists as well as a previous consultant for the American Dental Association's prestigious Council on Dental Practice.

Acknowledgments

Editing a textbook is all-consuming. Volume I took 3 years to design, develop, and complete. Once that textbook was published, it was this author's intention to take early retirement from the literary world. In short, I wanted my life back.

Time heals; witness the birth of Volume II. This never would have happened without the encouragement and continual support of close friends, colleagues, and family:

Suzanne Cohen—The love of my life, she gave me the consideration and space to make this latest project a reality.

Carla Kimball and Janell Edwards—Seattle Study Club staff who lent their expertise in the areas of clinical case editing, compilation, and graphic design.

Dr Gerard Chiche—My close friend in life who was always there to boost my spirits whenever I contemplated quitting while I was ahead. He helped me understand the importance of leaving a legacy.

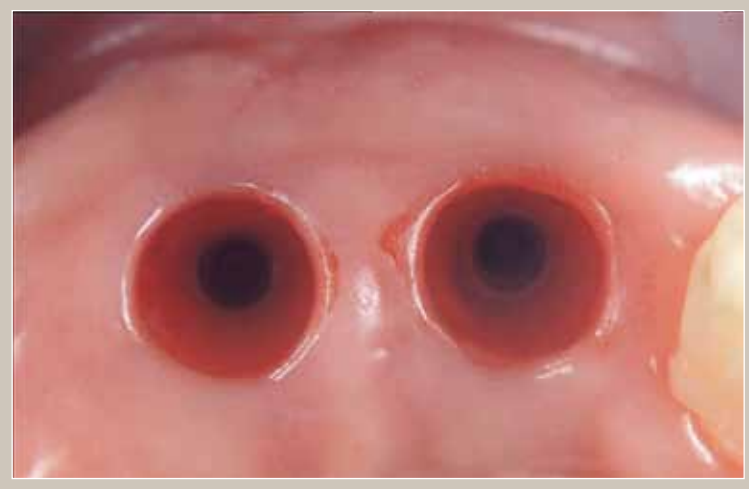
Tomoko Tsuchiya—Although I never really believed that I needed to write or edit a textbook to gain professional fulfillment, Tomoko helped me recognize the importance of making a significant contribution to dentistry and giving of myself to others.

Lisa Bywaters—Anyone who writes dental textbooks should be fortunate enough to have Lisa as a senior editor, sounding board, and coach. She was instrumental in convincing me to "pull the trigger" on Volume II and was always there to straighten me out whenever I veered off course.

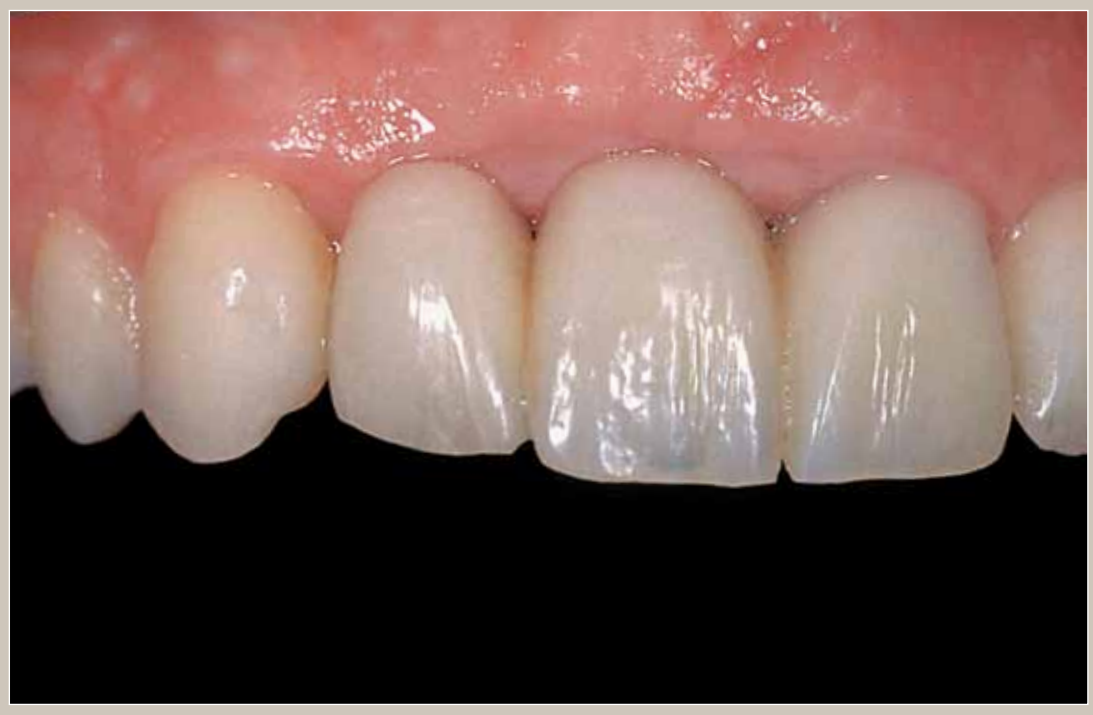
The Authors—I have come to learn that most respected clinicians and academicians do not have the time to write a chapter for a textbook, especially when it isn't their own! I feel honored that so many of these esteemed individuals were willing to support me by contributing at such a high level on this project.

H.W. and Christian Haase—Why is it that when the most recognizable dentists decide to write their own textbooks, they covet the thought of being published by Quintessence? The answer is very simple. The Haases are committed to publishing the finest, highest-quality dental textbooks in the world. They do not cut corners and subscribe to the philosophy that professional excellence is a necessary precursor to financial success. I consider myself fortunate to have had the Haases both believe in and support me in the quest to realize my goals and wishes.

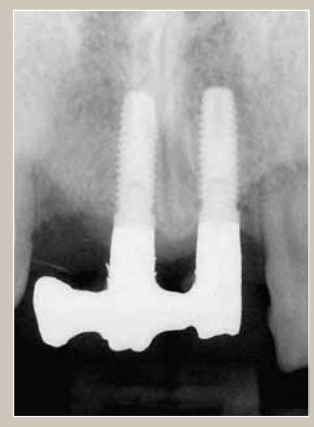
Implant provisional crowns with convex proximal contours and flat buccal submucosal aspects.



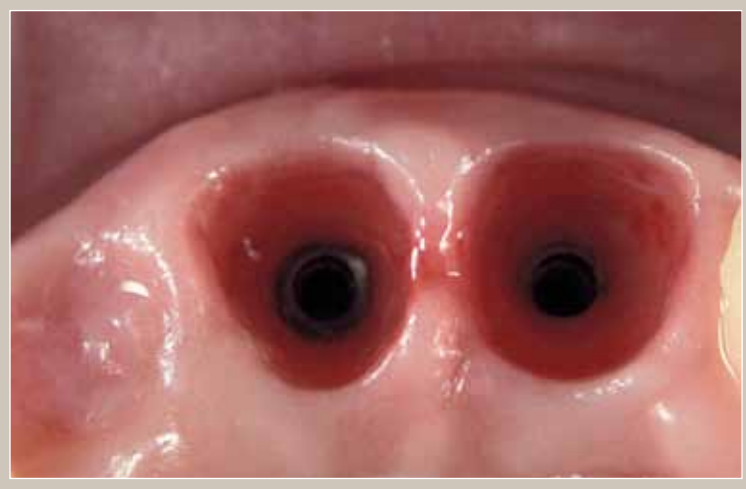
Occlusal view of implant heads and peri-implant mucosa following removal of healing abutments.



Provisional fixed partial denture in place.

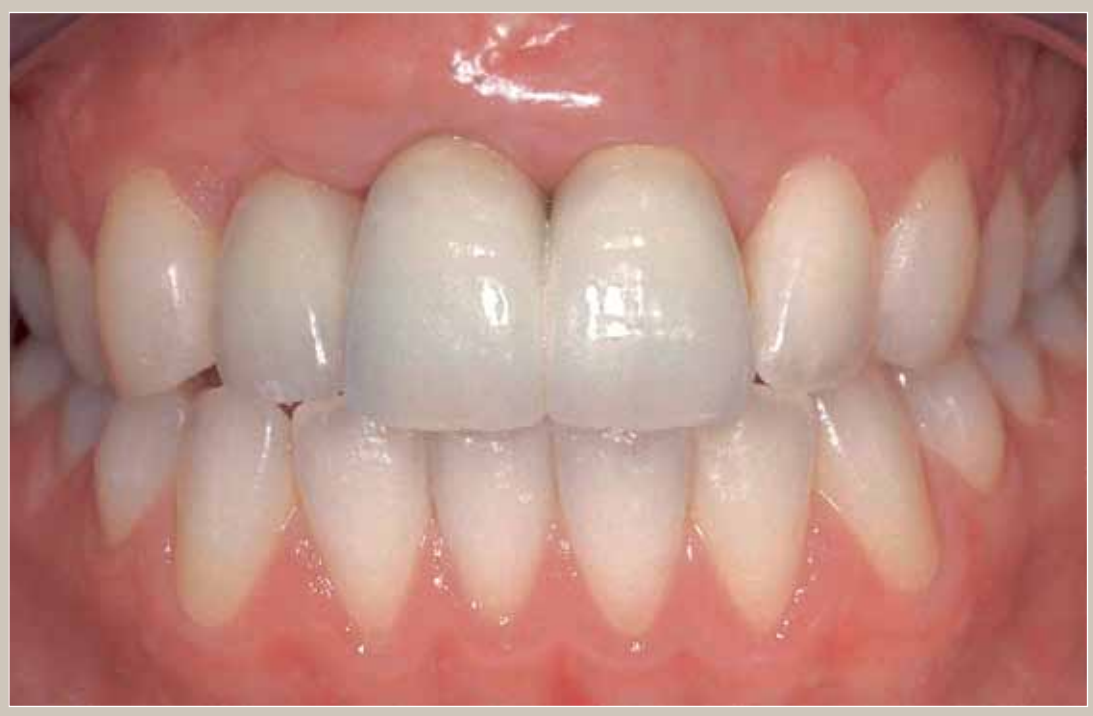


Radiograph with provisional fixed partial denture in place.

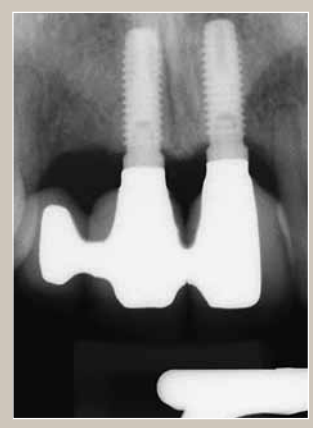


Occlusal view of peri-implant mucosa and pontic sites following removal of provisional restoration.

Occlusal view of definitive restoration on the cast.



Intraoral frontal view of the definitive restoration.



Radiograph with the definitive restoration in place.

Phase VII: Definitive restoration

Three months after the provisional restoration was fabricated, the treating clinicians verified that both esthetics and function were acceptable and initiated the steps toward definitive restoration. Following removal of the provisional restoration, it was determined that the peri-implant mucosa and the pontic site configuration matched the design that had been made on the master cast. Therefore, the same design was used for fabrication of the definitive restoration. For porcelain buildup, a plaster cast was used.

Because the soft tissue adaptation to the submucosal prosthetic configuration of the provisional restoration was acceptable, even though it did not duplicate the master cast design exactly, the same design could be used for fabrication of the definitive restoration. This would ensure identical shape, contour, and appearance of the provisional and definitive restorations. In cases where the provisional restoration has been modified intraorally and is no longer a blueprint of the mucosal design of the cast, an additional impression of the modified intraoral mucosa must be taken to serve as the template for the definitive restoration design.

A three-unit, screw-retained porcelain-fused-to-gold restoration was fabricated. The patient was 19 years old at the time treatment was completed.

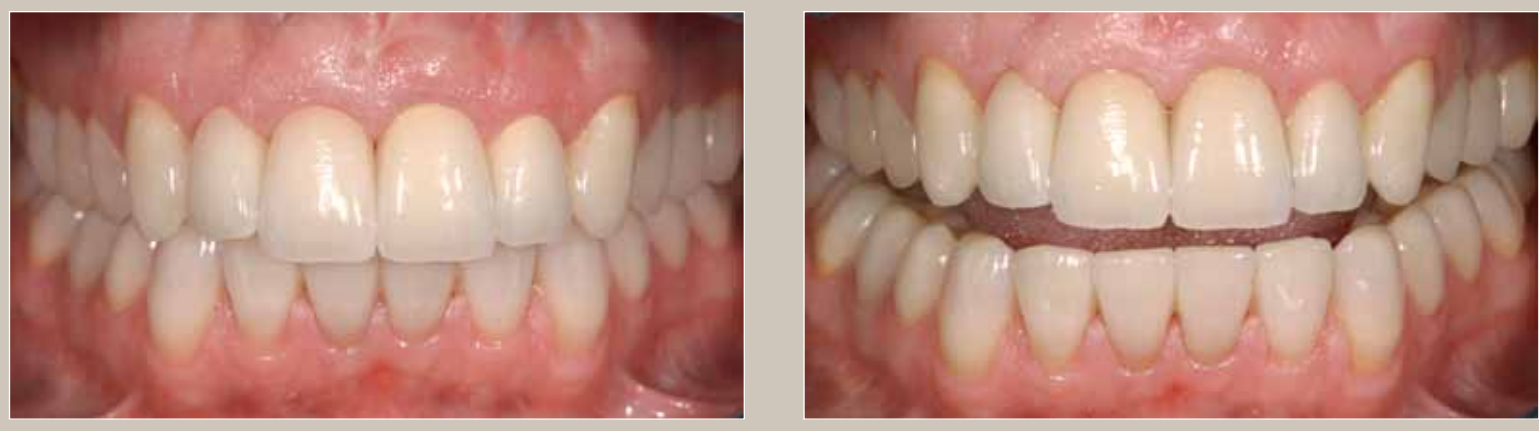
Mandibular posterior zirconia single crowns, a metal-ceramic implant crown for site no. 18, and the anterior teeth waxed up on the cast before replacement of the existing veneers.

Preparation of mandibular anterior teeth for veneers verified using silicone preparation matrix.

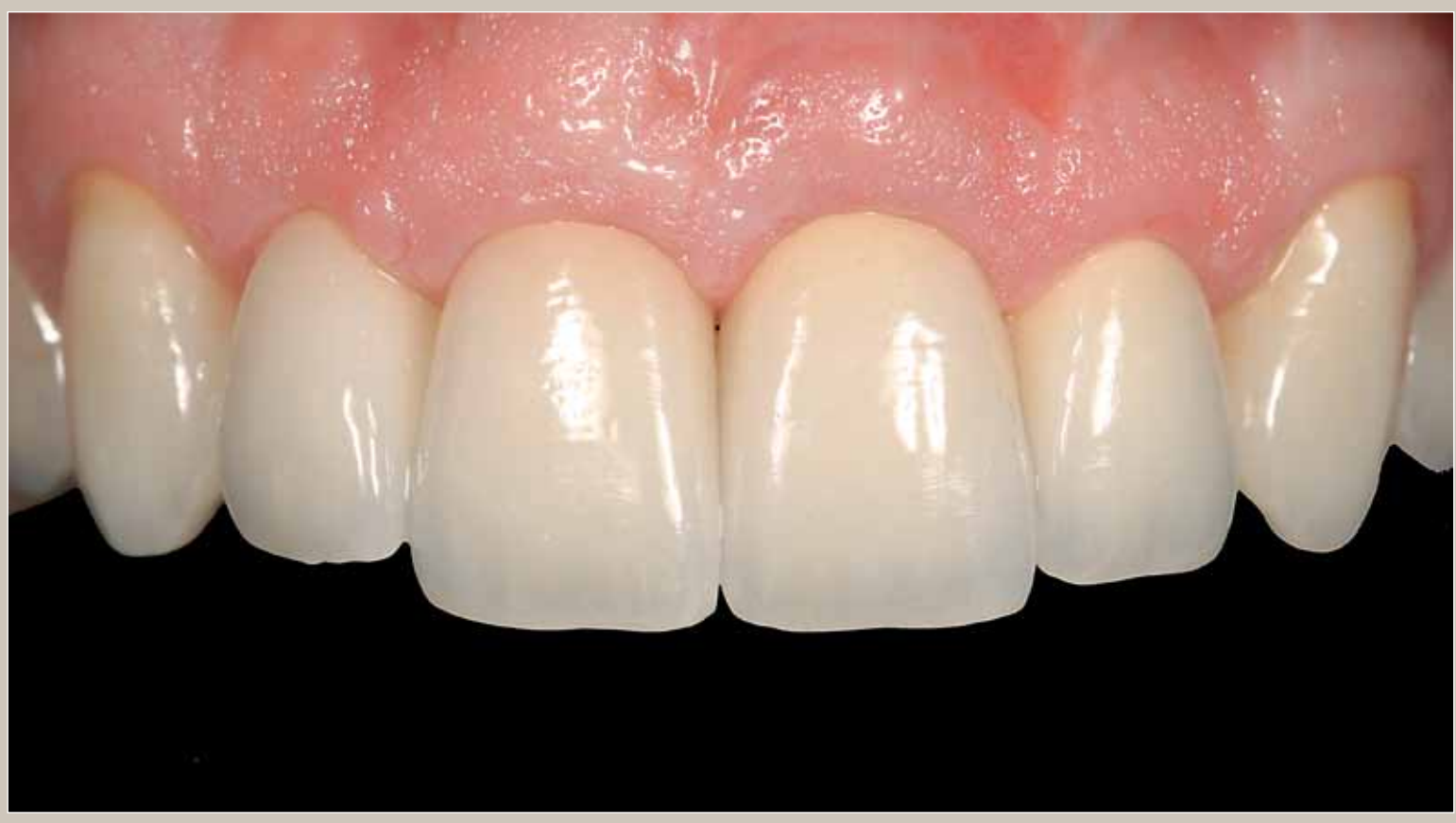
Ceramic powders mixed and layered on the refractory dies.

Mandibular anterior veneers following final contouring, shaping, glazing, and polishing.

Posttreatment



Intraoral frontal views of definitive restorations.



Esthetic integration of crowns on implant at site no. 8 and teeth nos. 6, 7, 9, 10, and 11.

Proposed Treatment Plan

Goals/objectives of treatment

· Eliminate disease
· Improve esthetics
· Fabricate a full-mouth rehabilitation that is more functional, with cross-arch stability and support of the vertical dimension
· Establish an occlusal scheme that places less force on the future abutments

Phase I: Treatment planning

1. Radiographs
2. Extraoral evaluation
3. Intraoral evaluation
4. Photographs
5. Diagnostic casts
6. Occlusal plane guide to determine the correct occlusal plane
7. Mounting of the maxillary cast with the occlusal plane guide using the Kois Dento-Facial Analyzer (Panadent) mounting platform
8. Mounting of the maxillary and mandibular diagnostic casts using the Kois Dento-Facial Analyzer mounting platform on the Panadent semi-adjustable articulator

Phase II: Fabrication of maxillary provisional restorations and interim partial denture

9. Cutting of teeth nos. 3 to 11 off the cast and replacement with setup for interim partial denture
10. Waxing of teeth nos. 2 and 12 to 14 for provisional restorations
11. Fabrication of the maxillary interim partial denture and provisional shells by the laboratory using the Dento-Facial Analyzer platform to set the maxillary teeth

Phase III: Initial therapy

12. Scaling and root planing in maxillary left posterior segment and mandibular arch with placement of Arestin (OraPharma) around existing implants
13. Extraction of maxillary teeth nos. 3, 4, 8, 9, and 11 with debridement of sockets
14. Provisionalization of tooth no. 2
15. Preparation of composite crowns and reline with acrylic shell to fabricate implant provisional restorations on the maxillary left implants, sites nos. 12 to 14
16. Reline of the interim partial denture for sites nos. 3 to 11
17. Adjustment of mandibular anterior teeth with selective grinding to develop an appropriate incisal plane

Phase IV: Healing and surgical planning

18. Waiting period of 6 to 8 weeks for tissue to close over extraction sockets
19. Soft reline of the fixed partial denture
20. Duplication of the maxillary interim partial denture for surgical stent fabrication
21. Radiographic evaluation by the periodontist for appropriate implant placement in the maxillary arch using the surgical stent, a panoramic radiograph, and the diagnostic maxillary cast
22. Planning for the placement of two implants in the maxillary right posterior segment (sites nos. 3 and 4), two in the anterior region (sites nos. 8 and 9), and possibly two in the canine regions (if bone is available) for a friction-fit galvano prosthesis

Phase V: Surgery

23. Patient sent to periodontist for implant placements with surgical guide
24. Implants placed in sites nos. 3, 4, 8, and 9 with healing abutments
25. Soft reline of maxillary interim partial denture
26. Wait 3 months for integration of implants

Phase VI: Use of implants to stabilize maxillary interim partial denture

27. Placement of temporary abutments on implants and relining of the maxillary interim denture to add stability

Phase VII: Optimization of mandibular contour and occlusion

28. Alginate impressions of maxilla (with provisional restorations and partial denture) and mandible (as is)
29. Wax-up of mandibular arch to level and align the occlusal plane and idealize the bite relationship
30. Fabrication of provisional shell from the wax-up
31. Preparation of mandibular composite crowns on Bicon implants intraorally
32. Removal of porcelain-fused-to-metal fixed partial dentures from remaining implants without disturbing the existing abutments, if possible
33. Extraction of teeth nos. 22, 23, and 27 and reline of mandibular acrylic shell with acrylic
34. Optimization of contour and occlusion

Phase VIII: Free autogenous gingival graft at sites nos. 23 to 26

35. Patient referred to periodontist to perform a soft tissue graft in the area of sites nos. 23 to 26 to address lack of attached tissue

Phase IX: Maxillary final impression and CR record

36. Placement of impression transfers on implants and packing of cord on modified abutments in maxillary left area
37. Final impression in maxillary arch
38. CR record of maxillary to mandibular provisional using bite rim

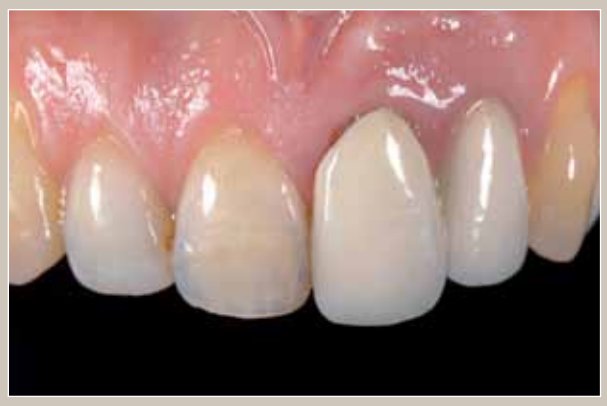
Phase X: Finalization and delivery of maxillary prosthesis

39. Removal of healing abutments
40. Torquing down of telescopic abutments
41. Placement of galvano copings on telescopic abutments
42. Try-in of frame for passivity
43. Cementation of telescopic abutments to frame
44. Back to laboratory for processing of prosthesis
45. Delivery of prosthesis and modification of occlusion if necessary

Phase XI: Mandibular final impression and CR record

46. Removal of provisionals and packing of cord around implant abutments
47. Final impression and CR record of maxillary definitive prosthesis against mandibular implant abutments

Phase XII: Finalization and delivery of mandibular prosthesis



Preoperative clinical situation.

Placement of the provisional fixed partial denture and appearance of soft tissue levels on the day of root profile modification of teeth nos. 9 and 10.

Improvement in soft tissue levels 2 weeks after placement of the provisional fixed partial denture.

Soft tissue graft.

Phase IV: Establishing the final treatment plan

The wax-up "project" and the intraoral design were translated into a final treatment plan. At that time, we contemplated what we could do to maximally enhance the final esthetic and functional outcomes, considering that the patient wanted little or no surgery and that the existing ridge deficiency could not be restored surgically if we wanted any symmetry in soft tissue levels and papilla heights.

The following ideas were planned:

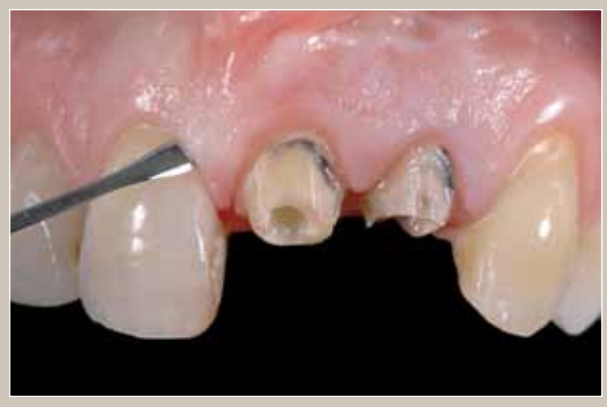
- We would improve soft tissue harmony and achieve a better balance in soft tissue levels by covering the remaining buccal recession on tooth no. 9 with a connective tissue graft.
- We would extract tooth no. 10 and replace it immediately with an implant.
- We would endeavour to optimize the prosthetic materials.

All-ceramic single crowns (e.max Press, Ivoclar Vivadent) were to be fabricated on teeth nos. 9 and 10. For the abutment, a lithium disilicate individualized pressed component would be bonded to a provisional titanium cylinder.

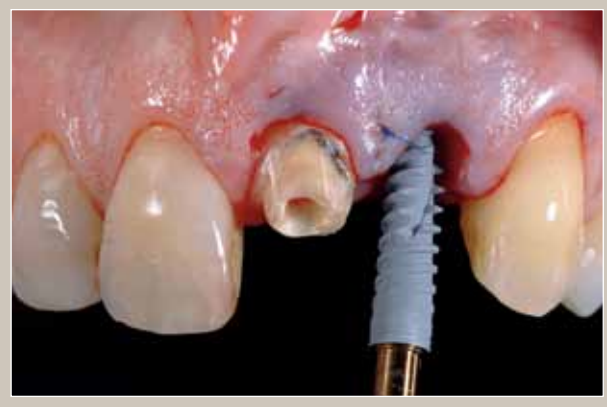
Phase V: Surgical treatment

A connective tissue graft was harvested from the maxillary tuberosity area and inserted in a split-thickness lateral pouch, starting from the distal aspect of tooth no. 9 and extending to the mesial aspect of tooth no. 11. Care was taken to maximize soft tissue thickness in the area where the implant would be placed. Seralene 6-0 sutures (American Dental Systems) were placed to secure the soft tissue graft into position.

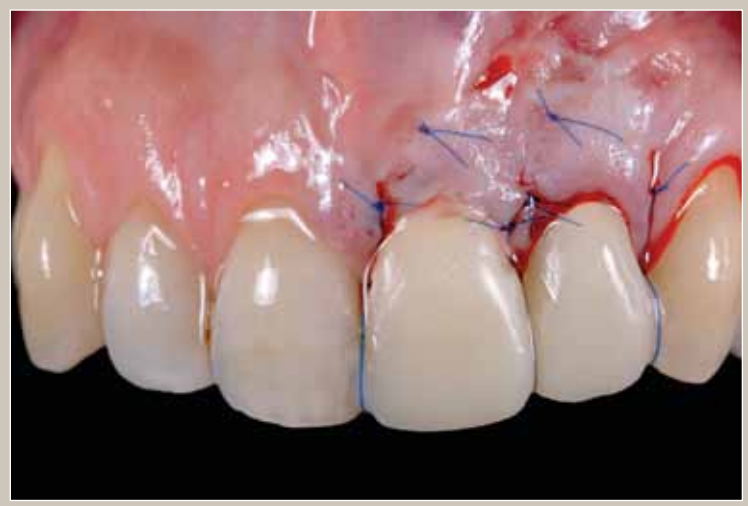
Tooth no. 10 was extracted atraumatically, and aggressive curettage and debridement of the extraction socket was performed. Immediate implant placement (NobelActive NP, Nobel Biocare) was guided by a surgical stent designed and



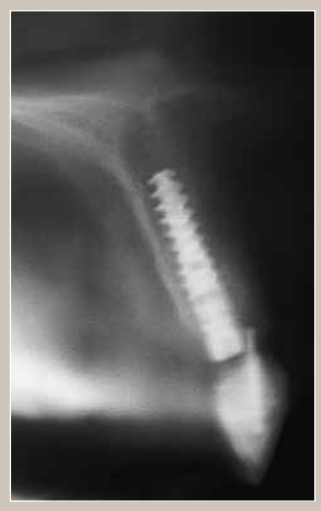
Incision for soft tissue graft placement.



Implant placement.



Frontal view of maxillary anterior teeth following soft tissue grafting and implant placement.



Tomography following implant placement.

Frontal view of maxillary anterior teeth 1 week after soft tissue grafting and implant placement.

fabricated from the wax-up of the approved provisional restoration. Care was taken to leave a gap between the buccal bone and the implant. A narrow healing abutment was placed, and the gap was filled with a bovine filler material (Bio-Oss, Geistlich). The provisional restoration was cemented.

On the postoperative computed tomography (CT) scan, the ideal 3D implant position was evaluated. The fill of the gap and the buccal defect with bovine bone was clearly visible on the same CT scan. Healing was uneventful, and the sutures were removed after 1 week.