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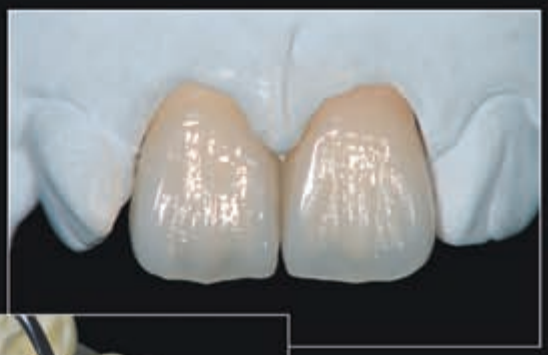

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Dear Reader,

Dr Sushil Koirala
Editor-in-Chief

_I have been quite busy for the past six months, travelling to different countries to attend various scientific conferences and official board meetings. I enjoy travelling the most when I also have the opportunity to learn and share professional knowledge and skills while doing so. Most of my national and foreign travels this year were related to my lectures and official meetings, as well as to the promotion of aesthetic dentistry.

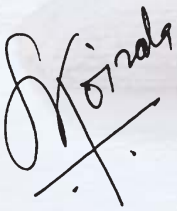
For the last ten years, I have advocated the Vedic Smile Concept and its protocol amongst our colleagues and encouraged them to incorporate its core principles—health, honesty, harmony and humanity (4H)—in their daily practice in order to ensure happy and healthy patients, employees and practice owners. The concept adopts the naturo-mimetic principles to harmonise the mind, body, behaviour and surroundings (MBBS) of a person by enhancing his/her smile with minimal intervention.

During the course of my international lectures, I have always received many enquiries about the concept. Most of these enquiries were from participants wishing to adopt it in their daily practice, which encouraged me to start a five-day Vedic Smile Dentist Programme in Nepal. The programme is part of the Dental Knowledge Tourism (DKT) initiative developed by the Vedic Institute of Smile Aesthetics and offered as part of the *Visit Nepal 2011* package. DKT is a unique concept in continuing dental education programme (CDE) that creates a wonderful opportunity for dental professionals who love travelling and wish to advance and share their knowledge and skill for better patient care.

CDE is mandatory in developed countries; however, it is still in the process of approval in South Asia. Dentists seeking to earn mandatory CDE points can now book a DKT package and travel along with their family to Nepal, one of the world's most popular tourist destinations. I personally believe that the concept of DKT can help foster harmony between business and family.

I am confident that you will enjoy reading this issue of cosmetic **dentistry**, which includes a variety of clinical articles, and welcome your valued feedback!

Yours faithfully,



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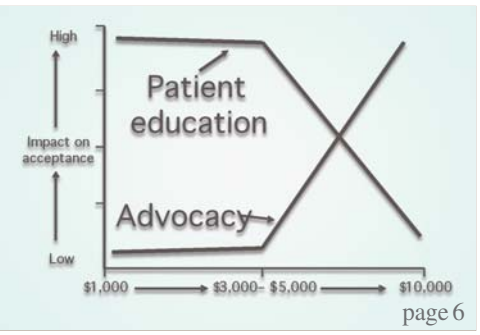

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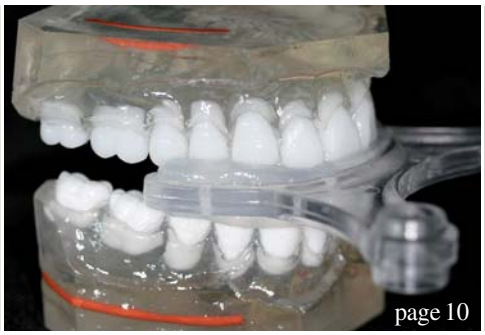
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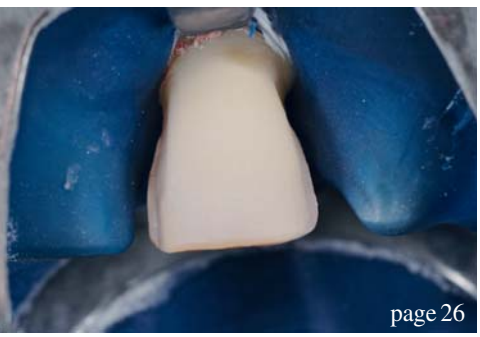
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it is the now big thing."

Donna J Abernathy
Training and Development Editor

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Case acceptance in complex-care dentistry

Author_ Dr Paul Homoly, USA

_I enjoy seeing the articles in cosmetic **dentistry** in which clinicians recount their creation of magnificent works of art through digital restorative dentistry. In most of the case studies I've read, I am sure the patient fees reach well over US$15,000 or more.

Let me ask you this: what percentage of your patients whose fee is US$15,000 or more are ready to start care immediately after you present their treatment plan? I have directed this question to thousands of my dentist audience members over the last decade and the overwhelming response is "fewer than 5 per cent". Is this because patients do not understand dentists' treatment recommendations? Or is it that the fee does not fit into their budgets? Chances are that both these apply.

As dentists we are pretty good at helping patients understand us and our treatment recommendations. What we are not good at is understanding our patients and the manner in which our treatment recommendations must fit into their lives. If you have heard it once, you have heard it a thousand times: the key to case acceptance is patient education. Go to dental seminars, read journals, listen to consultants; most of it sounds the same? educate, educate, educate. Now let me ask you this: is it true? Is patient education the solution to case acceptance?

If it is, then why do many new patients who have been thoroughly examined, educated and offered comprehensive treatment plans leave your practice and never return for care? Is it that you did not educate them sufficiently? Or is it that in the challenge of case acceptance, patient education is not the only answer?

Let's consider the new patient process and case presentation and learn when patient education works for us and when it chases patients out the door.

_Inside-out versus outside-in

How do we get patient education to work for us? Let's first make the distinction between an inside-out versus outside-in new patient process. The traditional new patient process is inside-out. It begins by studying the inside of the patient's mouth? the examination, diagnosis and treatment plan. It is after this inside look that we educate the patient with regard to all his/her problems? how he/she got them and what we can do about them, for example case presentation. After case presentation, we quote our fees and discuss financial arrangements. It is only once we have gone through our inside process that we discover what is happening outside the patient's mouth? his/her budget, work schedule, time and significant life issues.

The flow of conversation starts with inside-the-mouth conditions and ends with outside-the-mouth issues. I label this traditional way of managing the new patient the inside-out process (Fig. 1).

For patients with uncomplicated dental needs ? fees of US$3,500 or less? the inside-out approach with appropriate patient education works well. Here's why:

First, patients with minimal clinical needs are often unaware of them. Patients with conditions such as periodontal disease, asymptomatic periapical abscesses and incipient carious lesions must be made aware of them and educated regarding their consequences. Patient education is the driver of case acceptance when patients are unaware of their conditions.

Next, the inside-out process works well for patients with fees of US$3,500 or less because the outside-the-mouth issues? fees, time in treatment and life issues? are such that most patients can proceed with your treatment without undue hardships or inconvenience. Dental insurance reimbursements, patient payment plans such as

CareCredit and credit cards usually sooth the sting of fees for US$3,500 or less. Fees at this level are not insurmountable and usually do not anger or embarrass patients out of your office. But what if you present complex dentistry for more than US$3,500?

Let's suppose your fee is US$10,000 and it involves multiple, long appointments and your patient would lose time from work? Do outside-the-mouth issues get in the way of case acceptance now? Yes, they do. Does patient education make the unaffordable affordable? No, it does not. How do I know? You have proven it, have you not?

It is with the patient whose fee is greater than US$3,500 that I recommend an outside-in approach. Employing an outside-in approach involves initiating your new patient procedures with conversations? telephone and the in-office new patient interview? that focus on understanding what is happening outside the patient's mouth, such as significant life issues, budget and work obligations. Later in this article, I'll show you how.

After we have an understanding of outside-the-mouth issues, we do our examination. Then, during the post-examination conversation and case presentation, we link our treatment recommendations to the realities of their outside-the-mouth issues. Let me show you how.

The flow of conversation starts with outside-the-mouth issues and ends with inside-the-mouth treatment recommendations. I label this an outside-in process (Fig. 2). An excellent example of an outside-in process is the purchase of a home. Imagine you and your spouse decide to buy a new house. You go to a real estate agent and, just a few minutes into the conversation, you talk about price range, neighbourhood, schools, proximity to work, financing and down payment. These are all big picture, outside-the-home issues. Once you settled on the broad outside-the-home issues then, and only then, does it make sense to begin discussing the detailed inside-the-home issues, such as room size, carpet and tile selection, lighting, etc. Good estate agents discover what the suitability factors of home buying are (price, down payment, monthly payments, location, etc.) before they get into the inside details. In other words, the flow of conversation is outside-in.

Now imagine you and your spouse go to the estate agent, but this time she is a former dentist and uses the traditional inside-out process she used as a dentist. As soon as you sit down she begins educating you on the inside-the-house issues? the difference between cement slabs versus crawl space foundations and vinyl siding versus brick exteriors. She goes as far to recommend another appointment with her so she can show you how to keep your house clean before you buy one. She does all this before she has any idea of what you can afford and where you want to live. What would you think? You would think about finding another estate agent, would you not?

How many of your complex-care patients, after experiencing your inside-out process, find another dentist for the most likely reason that you spent a bunch of time educating them on inside-the-mouth details before you had any idea what was suitable for them? You educated them right out your door.

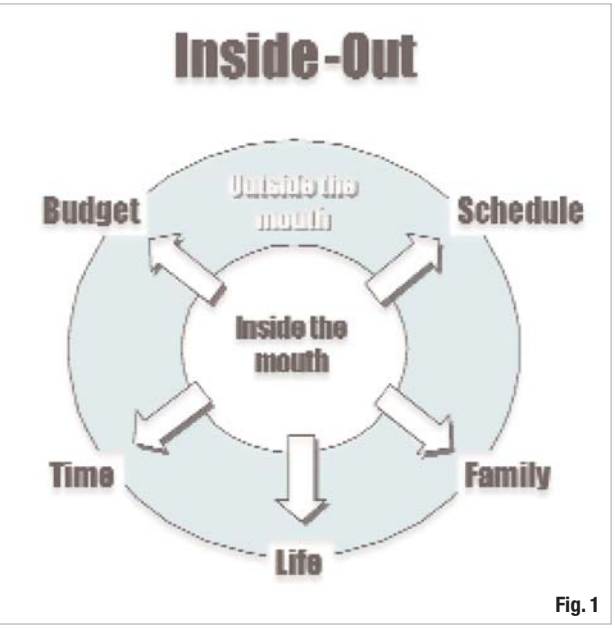


Fig. 1

An outside-in process works best for complex-care patients. Here patient education is not the driver of case acceptance. This is why: first, patients with complex needs often come into your office with a specific complaint? embarrassment about their appearance, aggravation by their dentures or fear of losing their teeth. They do not need to be educated about their chief complaint. They may not be aware of all their conditions, but it is most likely that they have lived with the complaint that brought them into your office for a long time.

Next, many complex-care patients have heard the patient education lecture about plaque, pockets and sugar many times before. It's old news and thus not a subject that distinguishes you. For many patients, patient education efforts bounce off like BB's fired at icebergs. Expecting to influence them into a US$10,000 treatment plan that does not fit into their budget by showing them how to floss well is naïveté.

Let me be clear at this point: we are going to spend some time on the patient education process with complex-care patients, it is just not one of the first conversations we will have.

The first conversations we will have with complex-care patients are about discovering outside-the-mouth issues—just like the suitability conversation with the estate agent. The outside-the-mouth issues of budget, time, work schedule, health issues are what I call fit issues. These are the issues into which your treatment plan must fit. Become good at discussing fit issues and you will save an incredible amount of time, you will sell much more dentistry and you will no longer blow patients out of the water—and out of your practice.

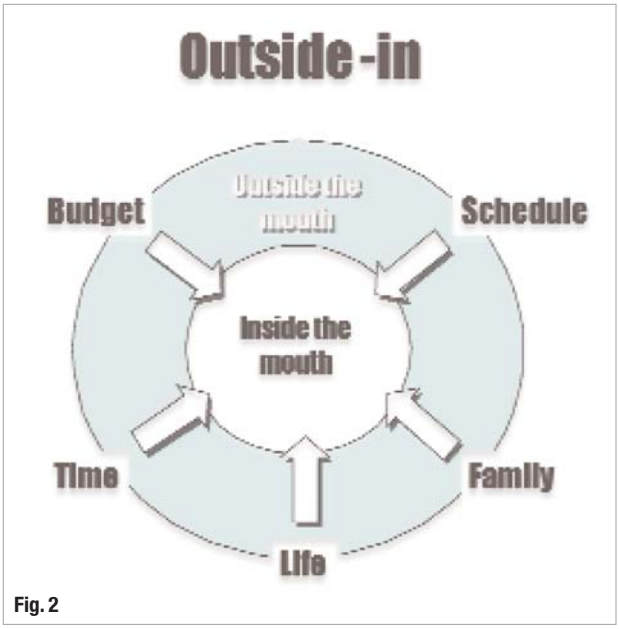


Fig. 2

_Fit versus change

The earlier influencers in my dental career emphasised that a significant part of being a good dentist is to get patients to change. Change the way they clean their teeth, change what they eat and change the priorities in their life and put dental health at the top. It took me ten years and thousands of patients to realise that patients change when they are ready, not when I tell them to.

I learned to replace the concept of *change* with the concept of *fit*. Instead of telling patients they need to change to accommodate my treatment plan, I learned to accommodate my treatment plan to fit their life situation. Patients, especially the more mature, complex-care patients, have complex fit issues. These include finances, family hassles, work schedules, special current events, travel, stressors, health factors, significant emotional issues; in short, any issues dominating the patient's energy and attention. When you present complex-care dentistry, it has to fit into the patient's life.

Think about it. If you offer most patients a US$10,000 treatment plan, something in their life has to happen. People need to wait to receive their tax refund, wait for a child to graduate from college, become more settled in their new job, or take a much-needed vacation. Knowing the manner in which your complex-care treatment plans fit into the current or foreseeable circumstances of your patient's life is a mandatory skill for practising complex-care dentistry. Without fit, there is no case acceptance, regardless of the level of dental IQ or your zeal for patient education.

_Discovering fit issues

Your team often knows what is going on in the patient's life. How do they know? They talk**?** they chit-chat with the patients and they make friends. Another purpose of chit-chat is to learn about those fit issues in your patient's life impacting their treatment decision. When chit-chat is intentional, I call it fit-chat—an indirect way of discovering patient fit issues.

When you fit-chat, be curious and listen more than talk. Listen to the manner in which patients spend their time and what's creating stress in their life**?** health, money and/or family issues. If they mention something you believe may influence a treatment decision, be curious, listen attentively and encourage them to talk more about it. Through indirect fit-chat, you're going to discover what's going on in patients' lives.

Some patients do not fit-chat well. They are simply not talkers. I am that way. When I get my hair cut, the last thing I want is a chatty experience. When you have a complex-care patient who will not fit-chat, you can try a more direct approach to discovering fit issues.

Here is an example of a direct approach: "Kevin, I know from the line of work you are in that you are busy and travel quite a bit. I also know you are aggravated by food trapping around your lower partial denture. Let's talk about your choices and how we can best fit your dentistry into what is going on in your life. Is now a good time to talk about this?"

Here is another example of a direct approach: "Kevin, most people like you are busy, on-the-go and have lots of irons in the fire. I need to know if any of these irons are affecting the amount of stress you are under, the amount of time you can spend

here with us, or if there are financial issues I need to consider when planning your care. I want to reassure you that I am very good at helping patients fit their dentistry into what is going on in their life."

Whether you are using an indirect fit-chat or a direct approach to discovering fit issues, an absolute prerequisite to a comfortable conversation is for you to have a connected communication style. This means you hold good eye contact, listen carefully and patiently; you maintain a conversational tone of voice and your speaking rate is relaxed. Be sure to pause long enough to let what you are saying sink in.

If you attempt to use a direct approach to fit issues but have a disconnected style (do not look the patient in the eye, speak too quickly, do not listen attentively), your conversation may be perceived as being inappropriate, unprofessional and seeking to diagnose their pocketbook sneakily.

_Advocacy

Advocacy is the experience of patients when they realise that you are guiding them towards and not selling them into dental health. To be an advocate is to be a guide. To guide patients into complex care effectively you need to take the fit circumstances of their life into account and help them find a way to fix their teeth in light of those circumstances. This may mean fixing their teeth now, later, or over time.

Here is something you say that propels the advocacy experience. It occurs after the examination, but before any detailed conversation about clinical findings. Here is where you link the fit issues you discovered to your clinical findings.

"Kevin, now that I have looked at your teeth, I know I can help you. We treat many patients like you with partial dentures that do not work well. I know I can help. What I do not know is whether this is the right time for you. You mentioned you travel a lot and your company is in the middle of a big reorganisation. Do you go ahead with your treatment now? Do we wait until later? Or do we do it over time? Help me understand how I can best fit your treatment into everything that is going on in your life."

This advocacy statement leads to a conversation about the patient's fit issues. This conversation reveals what treatment fits and what does not. You will find that this approach results in many complex-care patients doing their treatment over time, allowing them to stay within the limitations of their fit issues. This is a good thing. I would rather treat two patients for US$5,000 each than no patients for US$10,000. It also yields lifetime patients for you. Patients will exhibit fierce loyalty to you when they experience advocacy.

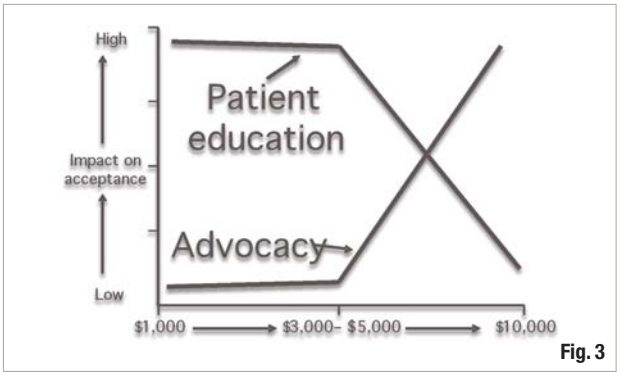


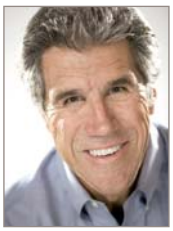
Fig. 3

_The decision to educate

The decision when to educate and when to advocate is situational. Figure 3 demonstrates that the impact of patient education on case acceptance is highest when the complexity of the care (and its associated fee) is minimal. Patient education is the driver of case acceptance when a patient's conditions and fees are minimal. However, when the complexity of care increases, the role of advocacy takes over. Advocacy is the driver of case acceptance when the patient's conditions are complex and fees are high. Copy Figure 3 and keep it in area where you will see if often. Then, right before you go into case presentation, look at it and ask yourself: does this patient need education or advocacy? Let the situation guide you. When you do, you will discover how to keep from educating your patients out the door._

_about the author

cosmetic dentistry



Dr Paul Homoly is a world-class leader in dental education. As a comprehensive, restorative dentist and acclaimed educator for over 25 years, he is known for his innovative and practical approach to dentistry. Dr Homoly is now offering *YES! On-Line* as the solution for dentists and their teams to excel at case acceptance. This on-line, seven-module curriculum, which is supported by a matching set of DVDs, takes your dental team step-by-step through the essential dental team-patient conversations, and has proven successful for over 30 years.

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Use of an X-ray phantom in dental 3-D diagnostics in digital volume tomographs

Authors_ Dr Georg Bach, Christian Müller & Alexander Rottler, Germany


Fig. 1a


Fig. 1b

Figs. 1a & b_DVT phantom (the maxillary sinus floor and *alveolar nerve of the mandible* are simulated with radiopaque wire structures).

_Undoubtedly, digital volume tomography has significantly expanded the range of dental imaging diagnostics. Just as Paatero ushered in a new era of dental radiology at the end of the 1950s with the development of the orthopantomograph and the resulting introduction of panoramic view imaging, 3-D processes will, in turn, replace panoramic view imaging.

Although digital volume tomography has to date been mostly used for pre-implantological planning and in reconstructive surgery, now other dental disciplines are beginning to appreciate the value of this process. It is in orthodontics, endodontics, dental surgery and periodontics that digital volume tomography represents a significant improvement of the possibilities of imaging processes. Its significance in the current domain, pre-implantological diagnostics, can be assessed as even greater.

_Available digital volume tomographs

Digital volume tomographs (DVTs) have been on the market for a good decade, and the number of suppliers of such devices has increased dramatically. When observing the device market, two clear trends are evident: the trend towards an all-in-one device (also called dual use) and the trend towards DVTs of various volumes.

All-in-one devices

In addition to offering 3-D diagnostics, the majority of DVTs available on the market also provide the option of producing panoramic view images (real images, not reconstructed from a data record) and sometimes even lateral cephalogram. These devices thus cover the entire range of dental large-scale diagnostics—in contrast with the first generation, which only offered the DVT option.

The DVTs of today's generation are often similar in design and appearance to traditional DVTs. The position of the patient with these and other frame devices is typically standing or sitting, while the once dominant supine patient position of the first-generation device is passé, except for that required by one DVT manufacturer.

Various volumes

The first-generation devices featured very large volumes that required time-consuming reworking


Fig. 2


Fig. 3

of the immense data record for problems beyond large and reconstructive surgery in order to be able to evaluate the relevant data and/or regions in a target-oriented manner. Today, numerous manufacturers offer devices with small and medium-sized volumes. Three types of devices are available:

_small volume (4 x 5 cm) for oral surgery and dental procedures;
_medium-sized volume (8 x 10 cm and higher) for oral surgery and reconstructive surgery; and
_large volume (18 x 20 cm and higher) for oral surgery and reconstructive surgery.

Problems with small and medium-sized volume devices

Small- and medium-sized volume devices are generally used for pre-implantological diagnostics, oral surgery, and orthodontic and endodontic procedures. The limited volume size requires careful device setting and patient

Fig. 2_DVT phantom in a DVT (Kodak 9000 3D, small volume) fixated on the original patient biting aid.
Fig. 3_Device settings: with the aid of the light visors, the volume is placed on the region to be captured (here region 26 and the maxillary sinus floor).

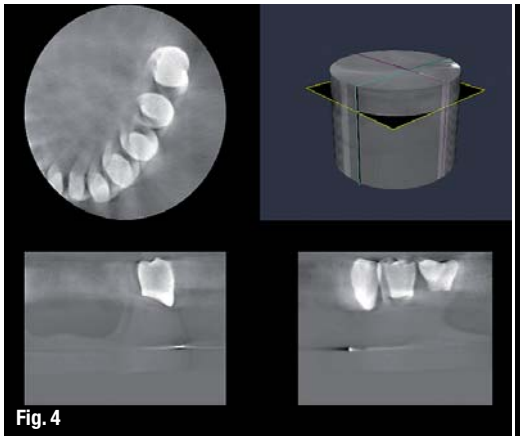
Fig. 4

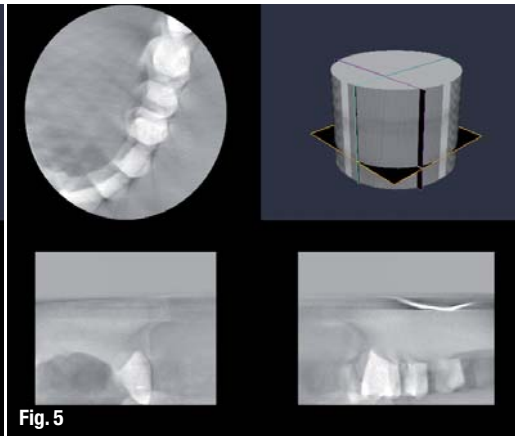
Fig. 5

Fig. 4_DVT phantom image of the maxilla with the DVT phantom.
Fig. 5_DVT phantom image of the mandible with the DVT phantom.

positioning so that the relevant structure is accurately captured.

For new users and those who only take volume tomograms once in a while, this correct setting can pose difficulties, which was our motivation for developing a DVT phantom that can be used for training purposes and for direct preparation of an image with a patient.

_The DVT phantom and its application

The DVT phantom is an X-ray phantom that depicts a medium-sized mandibular and maxillary dental arch with the teeth positioned in ideal denticulation.

The phantom, which consists of a mandible and maxilla, is mounted on the individual bite or positioning support of the respective device. Barium sulphate is added to the plastic teeth so that they are visible in the X-ray image. These teeth are made by the manufacturer especially for X-ray applications. The DVT platform is then mounted on the device with the original bite support instead of a patient. The device setting can be done in two different ways:

a) The desired volume is preset using the device programme and then manually fine-tuned.
b) The device is manually set directly upon the region to be captured with the aid of the light visors.

Thereafter, the set positioning is saved.

Using the DVT phantom for training and practice

With the aid of the DVT phantom and the above-mentioned setting techniques, new users, who are training to become dentists or dental technicians, can learn how to set the device for the regions to be examined, generate one or more individual images using the preview function and check whether the setting was correct. In the event of incorrect settings, a better image can immediately be generated. In this manner, there is a direct learning curve.

Using the DVT phantom for preparing a patient image

Time-consuming and tedious setting (aiming) of the DVT on a patient who is already in the device is likely to be uncomfortable for the patient. This is where presetting the device with the aid of the DVT phantom comes in handy. The desired region is captured with the phantom and, if needed, is checked with the preview function. Then, the phantom is removed and the patient is positioned in the device. Generally, only one device setting for the patient's body size and small fine-tuning are required before the image is set.

_How to obtain a DVT phantom

A DVT phantom can be produced in cooperation with practising dental technicians. The plastic teeth containing barium sulphate are available on the market and a phantom can be made in the manner described above. An easier option is to send a DVT positioning aid of your device to dtcmfreiburg@aol.com or through www.dtcmfreiburg.de. Master Dental Technician Christian Müller will then mount a prepared DVT phantom on your positioning aid. Industrially manufactured plastic teeth containing barium sulphate (SR Vivo Tac/SR Ortho Tac, Ivoclar Vivadent) will be used, which are then incorporated into a mandibular and maxillary model made of transparent plastic.

We hope that the fascinating field of 3-D diagnostics will establish itself quickly in dentistry and remain an imaging procedure that significantly expands upon the hitherto range of dental X-ray diagnostics in the long term._

_contact

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Imaging in dentistry: A clinical perspective

Author_ Dr Claudio M. Levato, USA

_Digital imaging in dentistry is a field of expanding possibilities and applications. Within the broad context of imaging, there are diagnostic, clinical and administrative applications. Diagnostic imaging can be radiographic, ultrasound, visible light and laser fluorescence. The clinical applications include surgical microscopes, magnified video systems and optical impression systems. The administrative applications are concerned with digital record-keeping, computer simulation, consultative and communication applications. In considering the number and types of imaging applications and the number of companies who manufacture and market these to dentistry, it is not surprising that many dentists are frustrated and confused as to the efficacy, implementation and financial implications associated with incorporating these technologies. This article will address the clinical perspective of these technologies, and the manner in which our office has incorporated many of these applications over the last few decades.

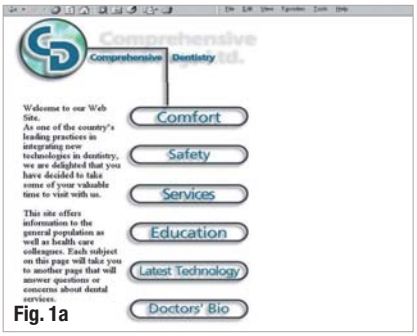

Fig. 1a

Fig. 1b

Fig. 1c

Fig. 1d

Fig. 1e

Figs. 1a–e_Our different websites over the years: 1993 (a); 1998 (b); 2005 (c); 2007 (d); and 2010 (e).

_History

A brief history of our office is necessary to put all this in perspective. Our private practice is 34 years old and has been a leading-edge practice since its inception. As with many other early adopters, our decisions were not always well thought through and return on invested dollar was not always considered and not always successful. I have used our office environment as a learning laboratory, which has fuelled my lectures, and published articles on technologies and leading-edge applications for over 20 years. The journey began in 1982 with our first computer, which served as a billing and accounting system. From there we transitioned to a mini-mainframe (Alpha Micro system) with server and operatory workstations in 1985. Fast forward to today; we have two office locations in suburban Chicago, connected by a T1 line and a single Eaglesoft dental software database (Patterson Dental) in a completely chartless environment.

Our early technology environment did not become complicated until we wanted to add clinical applications to our system. There were many challenges with technology integration, not the least were the cart delivery systems used by most of the companies. The first intra-oral camera system was

analogue, which came on a cart with a video printer and monitor. When digital radiology was first introduced, it too came on a cart with a PC, monitor and thermal printer; shortly after that you were able to link the intra-oral camera to the same PC as the digital radiology system. This evolved further by putting PCs in all the operatories so that you could eliminate the carts for image acquisition and make room for the lasers and CAD/CAM applications, which also came on wheels. We have worked with numerous digital radiology systems: Schick Technologies, DENTSPLY NI-DX (no longer available), Welch Allyn Reveal sensor (no longer available), Gendex Dental Systems, Planmeca sensors, DMD sensors (no longer available) and Myray X-pod wireless sensor (Cefla Dental Group). Having multiple sensor systems has its complications and it is most efficient to use whatever sensor systems integrates best and seamlessly with your dental software program.

It is a fair description that the ideal technology-focused dental office is one that is in a perpetual state of change. The continuous flow of evolving applications makes it essential that all systems are designed to be sufficiently flexible to allow future integration with minimal interruption. One thing that we must remember is that we are in the business of providing oral health care, and technology should be incorporated if it helps us better serve our patients.

_The World Wide Web

In today's economy, we have to assume a more global perspective of the impact of digital imaging on your practice. We have to realise that even before your patient makes that first call for an appointment, their decision was probably influenced by the Internet. Dental consumers are using the Internet in greater numbers to find the right fit for their dental and medical needs. So a web presence is becoming a key component for attracting and keeping your patients.

Fig. 2a

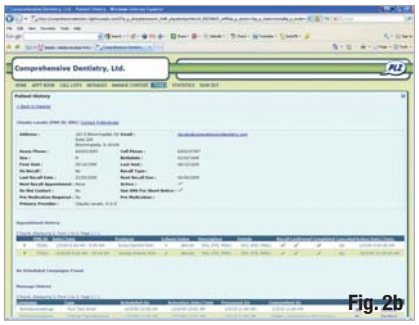

Fig. 2b

Fig. 2a_iPhone application for Lighthouse PLZ.
Fig. 2b_Patient history screen on phone through Lighthouse PLZ.

Once the patient has selected your office, everything that they experience will be measured by their expectations. It seems that today's society, especially those under forty, is always connected and in search of the immediate gratification of needs and wants. Technology is a tool that can facilitate meeting those expectations.

_Attracting new patients

The Internet has changed the way we use images and information. Years ago, we would work with a marketing company to produce a practice brochure with some direct mail pieces. The process would take months to create and implement, the downside to this approach is that it is costly and not easily amenable to changes. In today's Internet age, we can launch a simple website in hours and make changes whenever we need to. It is important to understand this new medium because creating a website that is not interactive is in some cases worse than no website at all. We have only a matter of seconds to attract and keep someone's attention, and if we do not have something to address their agenda, they move onto the next site. So website optimisation is actually more important than creating a beautiful site with animation and flash features that do not address the wants of your potential clients.

There are numerous companies that have been helping dentists navigate these waters successfully.

Fig. 3a_Initial digital photograph series.
Fig. 3b_Initial full series of digital X-rays.


Fig. 3a

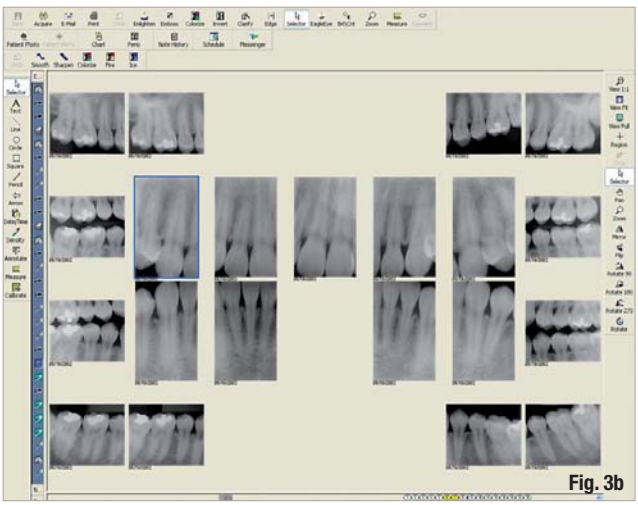
Fig. 3b

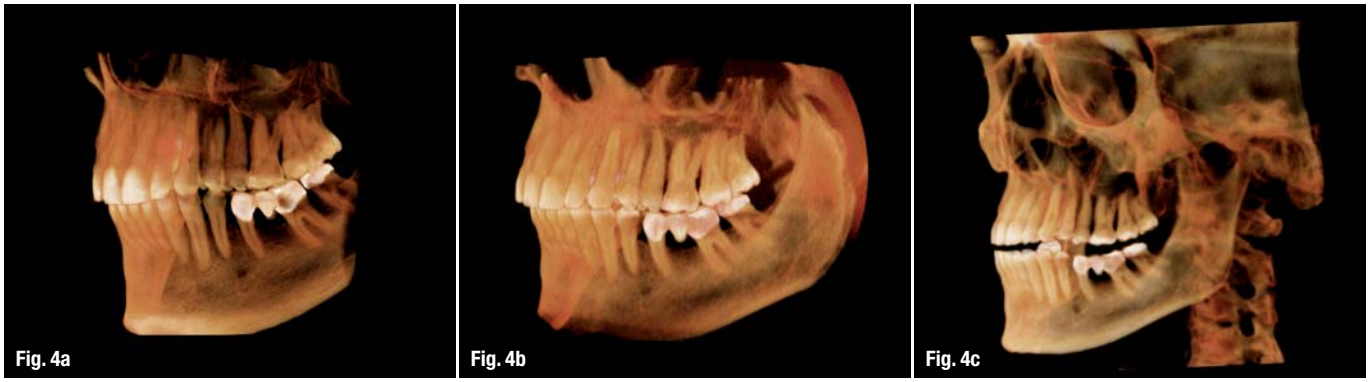

Fig. 4a_ProMax 3D (Planmeca): small scan imported into InVivo5.
Fig. 4b_MyRay Skyview (Cefla Dental Group): medium scan imported into InVivo5.
Fig. 4c_i-CAT (Imaging Sciences International): large scan imported into InVivo5.

We have used Curtis Marketing Group, Sesame Communications and Connect to Patients for creating and optimising our websites (Figs. 1a–e).

Patient access to schedule, account information and to paying bills online is provided by Sesame Communications as well. Lighthouse PLZ is another example of web-based solutions that work with your existing practice management software. We use this application to handle our re-care reminders (by text, e-mail or regular mail), electronic newsletter and our direct mail marketing, and to monitor practice statistics. They also have a smart-phone application to allow you to check patient schedule or history from your phone (Figs. 2a & b).

_Initial visit

During our initial visit, we review the medical history that the patient filled out on paper, which we scan into their digital chart, or we have them

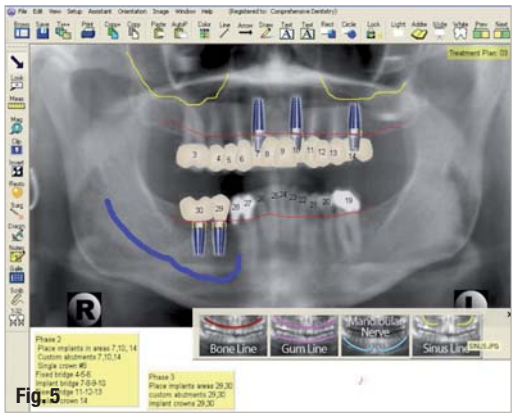

Fig. 5_XCPT 2-D implant planning and consultative tool.

fill it out on a tablet PC, which can be signed directly. We also have signature pads attached to all our administrative workstations. After the dentist has met the patient and reviewed the concerns, we have our assistant gather the necessary photographic and radiographic images. We use a digital camera to take a series of digital photographs, which will serve as documentation of existing conditions and for Invisalign records, if required, for cosmetic imaging or for referral communication (Figs. 3a & b).

Depending on the patient's concerns and existing condition, the radiographic imaging may be an intra-oral set of digital radiographs, a panoramic and bite wing set of digital radiographs, a CBCT (cone-beam computed tomography) scan for implant assessment and treatment planning. After acquiring the radiographic and photographic images, the clinical examination begins with an intra-oral video camera tour of the mouth, which the patient is able to view with the dentist, and examples of problem areas, as well as healthy areas, are shown in this co-discovery or co-diagnostic exercise.

The initial examination is in actuality a two-way street where we, as well as the patient, get to know and evaluate each other. Anything that will facilitate communication and provide options and solutions for the patient will go a long way towards building a trusting relationship. Technology is a double-sided sword; if it is used to impress or pressure a patient into accepting care, it can become a very negative experience, whereas if it is used as a vehicle to address their concerns and to help them co-diagnose their condition, the patient will most likely move forward with care.

Many practices have also incorporated stand-alone applications, such as VELscope (LED Dental, Inc.) and the Identafi 3000 (Trimira Remicalm), for help in oral-cancer screening by using high-energy light sources to visualise tissue fluorescence. Giving the patient an opportunity to see what we see is a very powerful tool in helping them own their dental condition and allowing us to become their advocate for care.

_CBCT

CBCT has been available since 2000; the driving force for this technology has been implant therapy. The cost for this technology has come down somewhat with the introduction of newer technology

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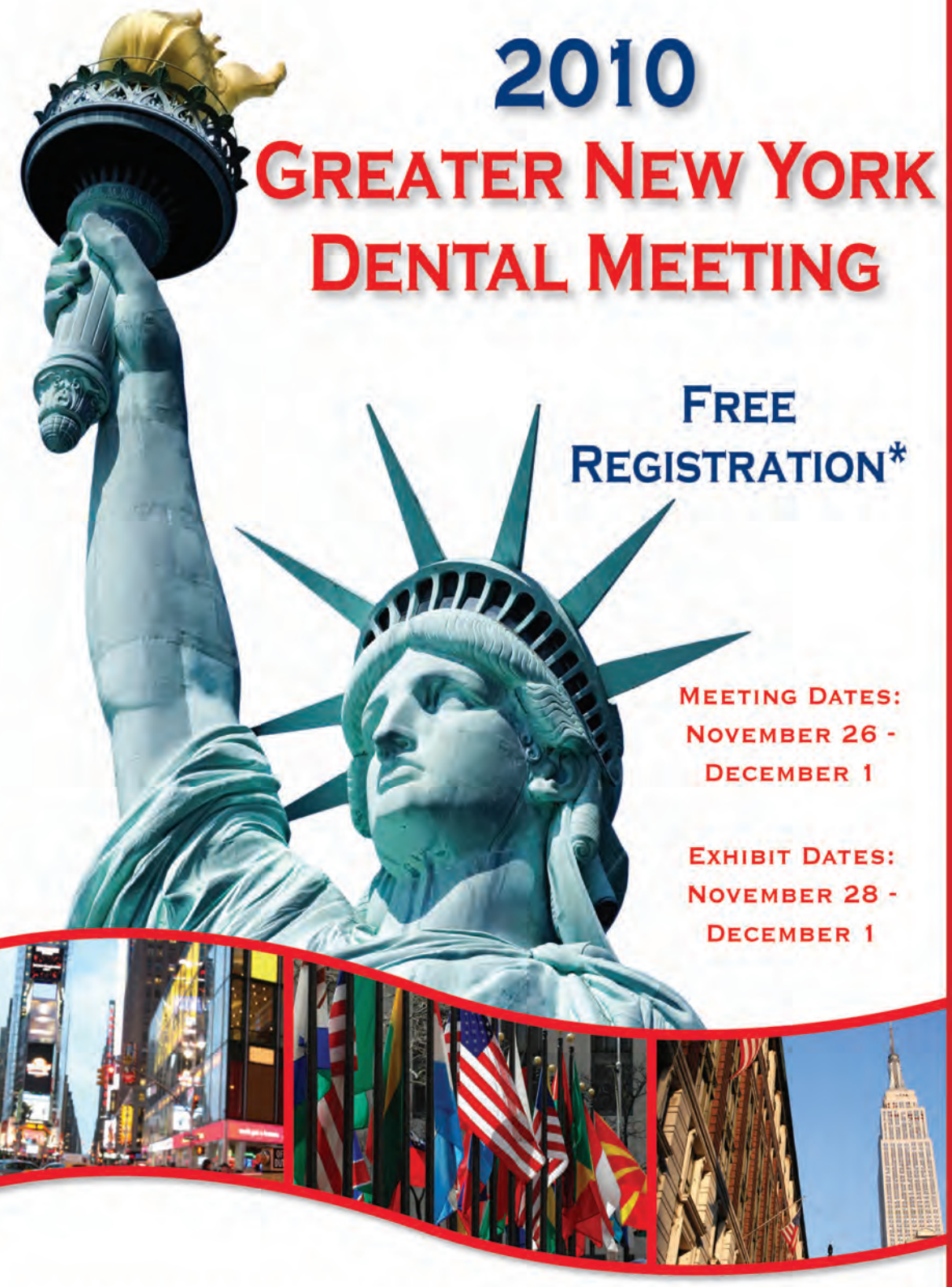

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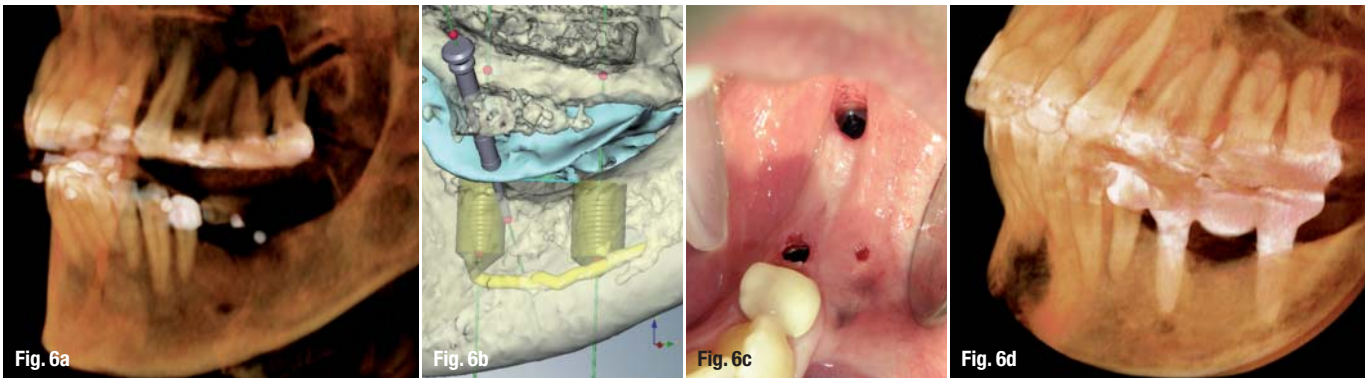


Fig. 6a_Pre-op CBCT scan with radiographic guide.
Fig. 6b_NobelGuide guided surgery plan.
Fig. 6c_Post-op implants seated with surgical guide prior to seating laboratory-processed provisional.
Fig. 6d_Post-op CBCT scan with implants and immediate provisional prosthesis.

and increased competition. There are currently at least 20 CBCT scanners available in the US, with more undergoing the FDA approval process.

All CBCT units provide 3-D information; however, each manufacturer approaches the project differently regarding its choice of patient positioning, scanning parameters and viewing software. CBCT units are most commonly categorised by their X-ray detection system, image-intensifier detector (II) or flat panel detector (FP). IIs are an older and less expensive technology that generally result in more noise than FPs and need to be preprocessed to reduce geometric distortions inherent in the detector configuration. The radiation beam is 3-D in shape and similar to photon energy used in digital or conventional dental radiology.

The receptor captures 2-D images either directly through the FP, which absorbs the photons that are converted to an electric charge, which is measured by the computer or with the II, which captures the photons and converts them to electrons that contact a fluorescent screen that emits light captured by a charge couple device camera. The software then reconstructs the sum of exposures using proprietary algorithms calculated by the manufacturers into as many as 512 axial-slice images.

Many CBCT units have a variable field of view (FOV) that allows the clinician to limit the radiation exposure to the region of interest. The limiting factor is the size of the image detector, which comes in a number of sizes depending on the manufacturer, but for the sake of simplicity we will categorise them into small (<15 cm), medium (15 cm), large (23 cm) and extra-large (30 cm) FOVs. The maximum image of a small FOV usually can accommodate most of the adult dentition. The maximum medium FOV can accommodate all the adult dentition extending into the condyles and sinuses. The maximum large FOV image encompasses the maxillo-facial anatomy, including the condyles and most of the orbits. Finally, the extra-large FOV can accommodate the full skull in most cases. Regardless of the volume capacity of the unit, it is important to restrict the FOV for the region of interest, which has a significant effect on the amount of radiation absorbed.

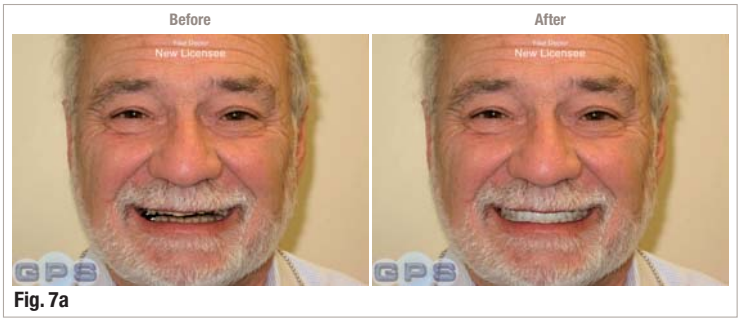
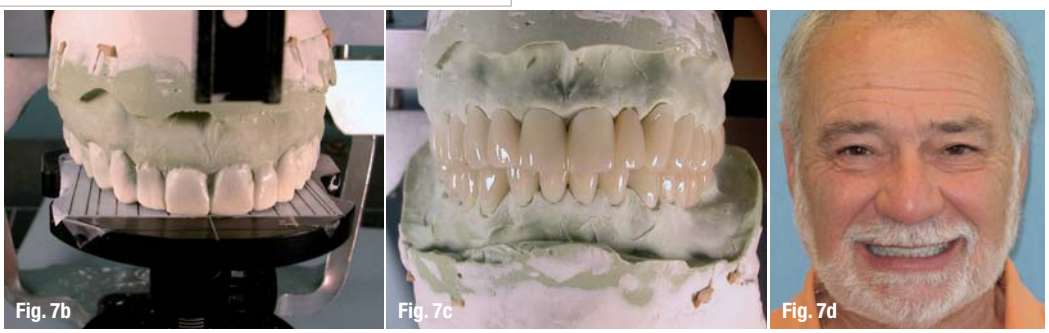


Fig. 7a

Fig. 7a_Prosthodontic simulation using Dental GPS.
Fig. 7b_Models being waxed up in the laboratory using Dental GPS.
Fig. 7c_Finished provisional restorations using Dental GPS.
Fig. 7d_Competed provisional reconstruction.



DICOM format images are standard for handling, storing, printing and transmitting information in medical imaging, including those from CBCT. In 3-D imaging, this becomes a great asset in exporting this data set to third-party software programs that will facilitate image renderings, implant-planning programs and making surgical guides to assist in implant placement (Figs. 4a–c).

_Consultative and treatment planning

Once the examination and diagnostic records have been collected, the process of interpretation, diagnosis, treatment planning and consultation come into play, with a myriad of applications to facilitate those processes. Current state-of-the-art systems are based on 3-D applications, but there are systems even for those who have been most conservative with technology applications. With a minimum investment in a laptop computer, a digital camera and software, a dentist can incorporate digital treatment planning and interactive consultation by using XCPT (XCPT, LLC). XCPT provides visuals of proposed treatment, such as crowns, bridges and implants on the patient's X-rays, CT scans, or photographs. The software saves time, reduces paperwork, streamlines workflow in the office and allows patients to grasp treatment concepts quickly and intuitively (Fig. 5).

When it comes to working in 3-D, there are a number of software applications that import DICOM files from any CT or CBCT unit, and then allow you to plan your case more accurately and many of these programs will also allow you to have a surgical guide made for guided implant surgery and immediate prosthetic restoration.

Programs such as InVivo (Anatomage, Inc.), Dolphin Imaging and Management Solutions, NobelGuide (Nobel Biocare) and SimPlant (Materialise Dental, Inc.) will all help you analyse your CT or CBCT scan and plan your implant treatments, but surgical guide construction can be influenced by which implant system you choose to work with.

If you work primarily with Nobel Biocare implants, NobelGuide—their proprietary software application—will allow you to format the DICOM data file from any CT or CBCT unit, design the case and directly order the surgical guide along with all the implant surgical, prosthetic hardware needed to complete the case. By working with a laboratory that has the NobelGuide software, your provisional prosthesis can also be constructed from the CT or CBCT data set (Figs. 6a–d).

There is a growing trend towards guided implant surgery. The benefit for the patient is that the surgical placement of implants and the insertion of the prosthesis can be done during the same visit. This is more costly but there is always a premium for the convenience. The challenge is that there is no room for error, so the dentist has to be prepared with a back-up plan, should there be complications during surgery.

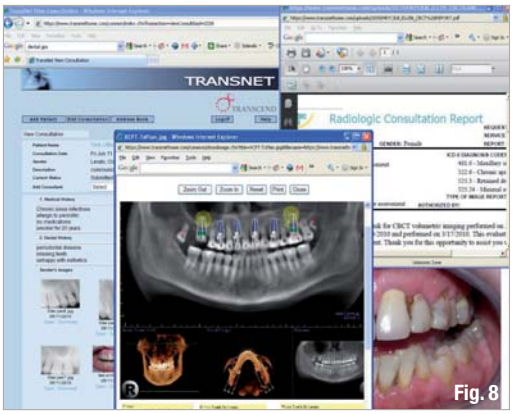
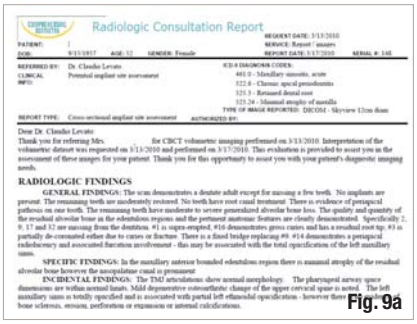


Fig. 8

Fig. 8_Multiple open windows of different file types in Transnet.

_Cosmetic imaging

Cosmetic imaging has been around for over 20 years, but recently a company has taken this application to the next level. Dental GPS (Dental GPS, Inc.) can simulate anything, from whitening to full-mouth reconstruction, with the subtle twist that it can morph the teeth into the existing soft-tissue envelope. What this means is that it can facilitate the predictability of your provisional and final prosthesis from the photographic simulation. By using the Kois Dento-Facial Analyzer System (Panadent) with face bow, the simulation can give the laboratory a guide to waxing up the case for provisionals (Figs. 7a–d).


Radiologic Consultation Report

RADIOLOGIC FINDINGS

GENERAL FINDINGS:

SPECIFIC FINDINGS:

Fig. 9a

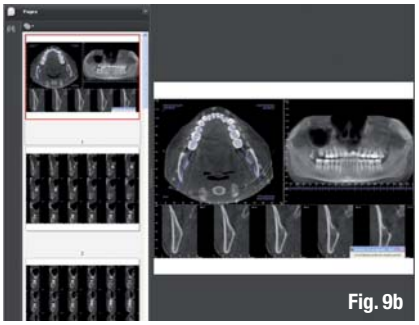


Fig. 9b

Figs. 9a & b_Example of radiographic report and report images returned by radiologist.

_Imaging communication

One of the most significant advantages of digital imaging is the ability to share images with colleagues for referral or second opinions. It facilitates interdisciplinary care and can save patients significant time and money. In today's fast-paced society, time is becoming a very limited commodity. Once you have examined the patient and have uncovered conditions that require other input, you can upload any kind of digital file and send it to any number of colleagues for input. We have been using an application called Transnet (Transcend) since 2000, which has significantly reduced the need for specialty consultation prior to treatment.

We have been using the same network of specialists for years and know the information they


Fig. 10a

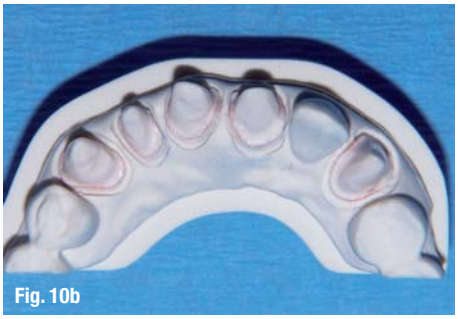


Fig. 10b


Fig. 10c

Fig. 10a_Assistant in one of our operatories taking optical impression with iTero.
Fig. 10b_Milled model from iTero scan that was sent to laboratory.
Fig. 10c_Finished restorations on iTero model.

would need to render an opinion and determine a fee for the procedure. They respond to our communication and we inform the patient and review the treatment and fee. Then the patient merely calls and sets up the treatment visit. This works extremely well for routine referrals, but complex cases still warrant separate specialty examinations (Fig. 8).

With CBCT's dramatic impact on diagnostic imaging, Internet data transfers are becoming more important. Most dentists are still unfamiliar with reading 3-D radiographic images and in the US, many dentists use the services of oral and maxillofacial radiologists to interpret those images in order to rule out possible pathologies. These image files are very large and thus usually need to be uploaded to an FTP site (Figs. 9a & b).

Another expanding 3-D technology that was first introduced 25 years ago was the original Cerec CAD/CAM system (Sirona), a 3-D optical impression system. There are several major companies that use different imaging technologies with similar results that exceed the accuracies of traditional impression materials—3M Lava COS uses streaming video, iTero (Cadent, Inc.) uses laser optics, Cerec AC (Sirona) uses Blucam—and there are some companies ready to introduce confocal digital impression technology (Figs. 10a–c).

_Conclusion

Hopefully this article has painted a realistic picture of what is actually possible in a clinical practice. Dr Omer Reed, a dentist visionary from Phoenix, Arizona, said over 40 years ago, "If something has been done, it is probably possible." There are dentists all over the world solving clinical issues for their patients by expanding the applications of existing technology in unique and different ways, pushing the envelope of science and art beyond the original intention and capability. Technology should not be the focus of the dental practice, but should be transparent and used when it provides solutions for your patients' concerns. The focus of technology is to allow us to provide better and more cost-effective services. As Dr Gordon Christensen, founder of Clinical Research, has been saying for decades: "Better, faster and cheaper is the mantra for justifying the investment expense for technology integration."

So it is evident that imaging in dentistry has become an integral part of every phase of dentistry. Unfortunately at this time, there is no single source that provides all these applications in a neat package; thus, the challenge of total seamless integration remains elusive and may never be fully realised.

If I have learned anything from my personal journey in technology implementation, it is that as soon as I have incorporated any new application, there undoubtedly will be limitations with new and different solutions right around the corner._

"The only constant is change, continuing change, inevitable change that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be."
—Isaac Asimov

_about the author

Dr Claudio M. Levato is in a private practice that has invested heavily in leading-edge technologies for over 30 years, spanning five computer systems and transitioning different operating systems to create a fully integrated digital patient record shared in two locations. Dr Levato is an author and lecturer on leading-edge technology and serves on several clinical advisory boards for radiology and restorative dental companies. He can be contacted at:

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Impression materials— Are there any REALLY new ones?

Author_ Dr Michael B. Miller, USA

Dr Michael B. Miller

_The most popular classifications of impression materials for precision restorations such as inlays, onlays, crowns and bridges are polyethers (PE) and vinyl polysiloxanes (VPS). But would you be amazed to know that PE were first introduced by ESPE (before the company was purchased by 3M) in 1965? Yes, Impregum has been around that long! How about DENTSPLY Caulk leading the way with VPS materials by bringing Reprosil to the market in 1982? A quick math check shows that there have been no other major category advancements on the material side of impression-taking in 28 years!

So what has changed and which of these changes really affect your chances of taking the perfect impression the first time?

_Hydrophilicity

One of the main advantages of the PE over VPS products is the inherent hydrophilicity of the former. Actually, hydrocolloid, which still shares a very small segment of the market, is the epitome of this type of material. It is generally considered that the more hydrophilic a material is, the less likelihood that fluid in the sulcus or really anywhere else on the preparation will distort the impression. The hydrophilic material will merely absorb the fluid and continue with its mission of registering an accurate and detailed impression. This property also goes hand-in-hand with the ability of the impression material to 'wet out' on the preparation and capture better detail. This latter property has enhanced my own personal experience over the years with PE, especially Permadyne (3M ESPE), which has long been one of my favourite materials.

But DENTSPLY Caulk trumped the market again with the first 'hydrophilic' VPS (Aquasil) in 1997. Since that time, there has been a race amongst manufacturers to create their VPS materials with as much hydrophilicity as found in PE. Note that hydrophilic properties in VPS products need to be additives, since these materials are not inherently hydrophilic as are PE. This race has escalated recently by several manufacturers showing what happens when you place a drop of water on a set or even unset mix of impression material. Presumably, if it beads up like water on a freshly waxed car, the material is not hydrophilic. But if it flattens out, it will do the same on a preparation in the mouth, showing it has enhanced hydrophilicity and wetting out ability.

The Reality Research Lab (RRL) has developed a more clinically relevant test, albeit more labour intensive. An acrylic model with prepared and intact extracted teeth is impressed with different materials after the teeth have been dried, coated with a glistening layer of water, or coated with a rather thick film of freshly captured saliva. Not only are the impressions and models from them examined closely, but full cast crowns are fabricated and marginal gaps measured under a stereomicroscope at 50x. A recent product comparison demonstrated virtually no differences between two popular materials.

On the other hand, bucking the hydrophilicity trend is one VPS marketed as 'hydrokinetic', which breaks down to simply mean 'moving water'. Well, you can't move water if you also love it, which is the essence of the meaning of 'hydrophilic'. There-

fore, another way of describing 'hydrokinetic' would be 'hydrophobic'. In other words, this product essentially returns to the early days when all VPS materials were hydrophobic. The RRL also tested this product, but the manufacturer did not specify another product as a control. This makes interpreting the data more difficult, although there were virtually no differences between the experimental groups, indicating that this product will perform as the manufacturer claims it will.

Does any of this matter when you are trying to take an accurate impression? Well, if the sulcus is filled with fluid, including blood, that is obscuring your margin, then it could definitely make a difference. If you are using a supremely hydrophilic material, you hope that the product will literally soak up the fluid similar to a sponge and, at the same time, register the impression.

On the other hand, if the material is hydrokinetic, the aim is to move the fluid out of the sulcus first and then capture the margin. Is this a better strategy? The answer is probably yes, since there is less chance that the fluid will distort the material, as it may do if it was absorbed. But if this strategy is preferred, why have virtually all manufacturers opted for the hydrophilic route?

One reason could be the mob mentality. If it works for one company, then other companies produce the same item with some slight tweaks. Another reason is that the concept flies in the face of the trend. Hydrophilic is the *in* concept, from bonding agents to cement to sealants. Why should impression materials be any different? And hydrophilic PE followed in the successful footprints of hydrophilic hydrocolloid. Finally, only one company thought of it.

So should you switch to a hydrokinetic impression material? Not necessarily. There are numerous other factors to consider, such as working and setting time, flow and availability in different delivery systems. All these criteria may be as or even more important than hydrophilicity.

And, of course, none of this matters at all if you use proper soft-tissue management BEFORE you even lay a diamond on the tooth. Preventing a bloody sulcus is much more effective than having to deal with it after the fact. This is my own personal mantra. I obsess over tissue management.

However, although this is an admirable goal, it doesn't always happen. Therefore, finding an impression material that will be 'forgiving' has significant value. This is why PE continues to garner kudos from its devotees—these products tend to be less sensitive to moisture and have a terrific ability to wet out the preparation under adverse conditions.

_Viscosity and flow

This is an issue that goes back to how you prefer to take an impression. I personally prefer a very light body/heavy body combination. Therefore, I look for a light body material that syringes easily and flows well without being too runny, combined with a heavy body tray material that will push the syringe material firmly against the preparation and, at the same time, not run down the patient's throat. Less popular is a monophase material for both the syringe and tray.

But very low viscosity syringe materials combined with heavy body tray materials is not new, although the RRL tests on flow using the Shark Fin device developed by 3M ESPE have found more recent selections with high flow. This means if you're like me, you no longer have to stick with one or two brands to get better flow in your syringe material.

_Hardness/stiffness

With the increasing popularity of closed-mouth impressions, especially with sideless trays, a more rigid or stiff material should work better by providing lateral support, although to my knowledge, this has never been shown in a clinical comparison. Nevertheless, there have been a few materials that the RRL has measured using a digital durometer that are indeed stiffer than the rest. Just don't be tempted to use a very rigid material for a full-arch impression, especially if you are using a well-fitting custom tray—you may need a 'knee-on-chest' manœuvre to remove it from a patient's mouth!

_Dispensing options

Another area with some significant changes is mixing/dispensing. The hand-mixing of tube-based products in the past has been largely replaced with cartridge-based products mixed and dispensed using a ubiquitous automix gun. However, these guns are no longer exactly cutting edge, look like you bought them in a home-improvement store, and can make filling a full-arch tray a real challenge for an auxiliary due to the hand and forearm strength required for heavy body materials.

To overcome the disadvantages of guns, ESPE introduced the first electronic mixer in 1995.

There have been tweaks and speed improvements in these machines, which have been cloned by a handful of competitors over the ensuing 15 years, but the overall design is largely the same as the original version.

For syringe materials, at least two VPS products have unidose versions. While I like unidose packaging, it doesn't seem to have caught on with impression materials and has not been a real factor in product selection.

_Intra-oral working time

Our thirst for speed has resulted in the availability of a number of very fast setting materials, which can be a real time-saver when you impress one or two teeth. The problem is when you try to stretch the use of fast-set materials for more than the aforementioned one to two units. The intra-oral working time of these fast-set materials then becomes a major issue.

Unfortunately, the working times provided by manufacturers are typically determined at room temperature. While this provides somewhat of a comparison between products, it doesn't really give you much indication about how much time you have between the inception of syringing the material around your preparation and when you need to seat the tray. For example, if you are taking a ten-unit impression, how much time do you have from when you syringe material around the first preparation and when you need to seat the tray? This is critical to know because the material syringed around the first of the ten preparations is already starting to set, which is accelerated by the heat and moisture of the mouth. If it sets too fast, the tray material will not bond adequately to the syringe material and you'll most likely end up with wrinkles or other types of distortion.

To my knowledge, there are only two extended working time VPS materials on the market, both of which were introduced in recent years. For large cases, it would be prudent to consider using one of them.

_Tear strength

If you have ever removed an impression from a patient's mouth and found that it has torn on a critical marginal area, you know how important this property is. I recently took an impression for ten veneers in a patient who had open gingival embrasures. Normally, I would block out these embrasures from the lingual to prevent the impression material from locking into them and tearing on the way out of the mouth. But I was using an 'improved' formula of a well-known material that had claims of high tear strength. Therefore, on this case, I decided to go for it and dispense with the block-out procedure. Sure enough, the impression tore. I took a second impression and it also tore.

The guru of tear-strength testing in my opinion is Dr Alan Boghosian, a member of the REALITY Editorial Team. Dr Boghosian and his colleague recently completed a test of eight impression materials for the RRL. The material I used that tore in the mouth scored in the middle of the pack, not quite matching the strength forecast by the manufacturer. To be fair, even though the impressions I took did indeed tear, the margins were still captured and the veneers seated beautifully.

Nevertheless, since a torn impression can ruin an otherwise perfect effort, it would be wise not to tempt fate and block-out areas that could cause tears, such as the aforementioned open embrasures, assuming, of course, these areas don't need to be captured.

_What to use?

Many aspects of taking an impression are personal. For example, you get to select the material that meets your flow and set-time requirements. But beyond that, don't get too caught up with marketing slogans such as "vinyl polyether silicone" or "polyeasier". There are still only two real classes of impression material, same as they've been for the past 28 years. And remember—no impression material can do it all. To get the best of all worlds, you probably need to stock two or three different types to cover all clinical situations as efficiently and productively as possible._

Editorial note: This article originally appeared in the March/April 2010 issue of General Dentistry. It is published with permission by the Academy of General Dentistry.

_about the author

cosmetic dentistry

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Authors_ Dr Stefen Koubi & Gérald Ubassy, France

Fig. 1_Pre-op view.
Fig. 2_Mock-up.


Fig. 1


Fig. 2

_The loss of the interdental papillae is a grave consequence of periodontal disease. Surgical reconstruction is still not feasible. There are several approaches to reducing or masking the black triangles that occur as a consequence of the missing papillae. Conventional restorations are an option if the teeth also show increased mobility. If this is not the case, that is, if the periodontal tissue is healthy, it is crucial to find a biomimetic solution, meaning that the restoration should take aesthetic, biomechanical and biological factors into account.

_Initial situation

The treatment of missing papillae by means of ceramic veneers will be presented on the basis of a clinical case. A female patient around the age of forty was unhappy with the look of her smile, which she described as "disgraceful". The aesthetic diagnosis consisted of an analysis of the features of the face, the smile, the teeth and the gingiva. The analysis (Fig. 1) revealed the following findings:

_face: tense and shy look due to self-consciousness about her teeth;
_smile: considerable aesthetic compromises due to the black triangles;
_teeth: healthy triangular, curved teeth; the margins of the roots are visible;
_gingiva: healthy periodontal tissue; interdental papillae are missing; the teeth are stable; recess at tooth #12; and
_radiological examination: regular alveolysis in the cervical third.

_Procedure

The following procedure was determined on the basis of the analysis:

_surgical intervention at tooth #12 in order to increase the gingiva (transplantation of connective tissue);
_fabrication of a mock-up in order to visualise the final result;
_tooth preparation on the basis of the mock-up;
_temporisation;
_try-in of the veneers (adaptation, shape and shade); and
_incorporation of final restoration.

_Treatment course

Surgical intervention to increase the gingiva

Connective tissue was removed from a lobe that was moved towards the tooth crown. Before further treatment was conducted, a four-month healing phase was necessary.

Preparation of the mock-up

A silicone matrix was fabricated on the basis of the wax-up, which was based on the findings of the aesthetic analysis. The temporary restorations were fabricated with the help of the matrix from a self-curing, flowable Bis-GMA-based composite. This allowed us to discuss the restoration beforehand with the patient, who provided her input and approved of the restoration (Fig. 2).


Fig. 3

Fig. 3_Preparations with sub-gingival margins in the proximal region.

Preparation

In order to keep the depth in check and observe the biological concept, the drill was placed directly on the mock-up. With this procedure, a uniform thickness of approximately 0.5 mm is achieved on the basis of the volume of the final restoration.[1] After removing the preparation key (mock-up), the presence of larger, non-prepared enamel areas is observed. In the present case, the treatment protocol was slightly varied in view of the cervical preparation margins: usually, the preparation margins are located above the gum line for veneer preparations; in this case, however, the margins had to be designed sub-gingivally (Fig. 3).

This approach was chosen for various reasons: in order to eliminate the black triangles, meet the biological requirements (cleaning and soft edges) and consider the biomechanical properties of the ceramic (prevention of non-supported areas in the ceramic), only one single contact surface with a soft transition from the edge of the root to the margins of the contact surface could be designed to mask the missing papillae (Fig. 4).

The all-ceramic veneers were fabricated with the IPS e.max Press (MO1) lithium-disilicate glass-ceramic material and the incisal third was veneered with IPS e.max Ceram (both Ivoclar Vivadent). The pressed veneers, which showed a minimum thickness of 0.3 mm, feature a high stability and outstanding accuracy of fit on the one hand and excellent light-optical properties on the other.

Try-in of the IPS e.max Press veneers

After removing the temporary restorations, all veneers were tried in simultaneously. This enabled the overall appearance to be visualised. Subsequently, the accuracy of fit was checked. Variolink Veneer Try-In paste (Ivoclar Vivadent) was used for this procedure in order to simulate


Fig. 4


Fig. 5


Fig. 6


Fig. 7

Fig. 4_Checking the relation between the preparations and the volume of the final restoration with the help of a silicone matrix.
Fig. 5_Isolating individual teeth in order to achieve optimum bonding.
Figs. 6 & 7_Lateral view of the IPS e.max Press veneers from right (Fig. 6) and left (Fig. 7).


Fig. 8


Fig. 9

Fig. 8_Frontal view of the restorations; an expansion of the interdental papillae can be observed.
Fig. 9_View of the maxillary teeth; the optical properties of IPS e.max Press material are particularly highlighted in this image.

the effect of the cementation material on the shade of the restoration.

Clinical procedure

The veneers were individually cemented using the adhesive technique, starting with the incisors (Fig. 5), followed by the lateral incisors and canines and so on, thus allowing the clinician to carry out corrections on the proximal areas of the less prominent teeth (distal surfaces of canines or premolars). The restorations were conventionally placed with Variolink Veneer (Ivoclar Vivadent). In a last step, the composite joints were carefully finished with a scalpel in order to maintain the surface gloss of the ceramic and the excellent fit in the periodontal tissue (Figs. 6–8).


Fig. 10

Fig. 10_Light transmission through IPS e.max Press veneers.

_Conclusion

Clear communication between the dentist and the dental technician is mandatory in clinical cases such as this to allow as much information as possible to be exchanged (models, images of the initial situation, images of the preparations and their shade, impression of the temporary restorations in place, shade determination). In the present case, the ceramist designed the margins of the contact surfaces on the stone model 2 mm from the papilla because the distance between the contact point and the tip of the papilla had to be less than 5 mm in order to allow the papilla to grow back.[2] After some months, the papilla will have grown and filled the small spaces that were reserved for it. This is also a confirmation of the bio-compatibility of the lithium-disilicate glass-ceramic IPS e.max Press (Figs. 9 & 10).

By strictly observing the treatment strategy and using materials that show optimum optical and biomechanical properties, the patient's smile was modified and restored in accordance with the principles of minimally invasive dentistry.

I would like to thank Gérald Ubassy for his cooperation and his exceptional talent._

Editorial note: A list of references is available from the publisher.

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First whitener for fixed-braces orthodontics

Authors_ Dr Enrique Jadad, Dr Jaime Montoya & Prof Gonzalo Arana, Colombia


Fig. 1


Fig. 2

Fig. 3

Fig. 1_Patient under orthodontic treatment.
Fig. 2_Close up of patient under orthodontic treatment.
Fig. 3_Treswhite Ortho ready to be used.

_The following article describes the use of a new dental whitening product based on hydrogen peroxide (H_2O_2). The effect of this compound whitens dentine in multidirectional angles, reaching areas covered by brackets, making it possible to achieve teeth whitening under braces. Patients are very willing to use this whitening procedure, both in-office and at home, because they want to achieve white teeth while under orthodontic treatment. The result is a whitening technique that also achieves a marked increase in patients' oral hygiene habits.

The use of the H_2O_2 as a dental whitening agent was first described by Kingsbury in 1861. The dentists' desire to provide fast and effective teeth whitening procedures was described by Abbot in 1918, when he introduced a wonderful and revolutionary in-office dental whitening technique—a 35 % H_2O_2 concentration together with heat emission from a lamp to increase oxidation.[1] In 1989, Haywood and Heymann described a technique for daily use that used a low carbamide peroxide concentration to remove deeper teeth stains, which increase with age.[2]

_Dental whitening popularity

The success of H_2O_2-based teeth whitening products has been accepted and validated by research. The successful use of H_2O_2 for dental whitening, using different techniques for in-office and at home treatment, has been described by many authors.[3] Messages on TV and in newspapers, magazines and other media have popularised dental pigments and teeth-stain removal, caused by age, food, cigarettes, tea, and beverages with colorants, amongst others causes. People ask for dental whitening treatments to achieve better aesthetics, improve their smile and their self-esteem, all of which are closely related to dental pigmentation.[4]

Fig. 4_Treswhite Ortho tray in the upper maxillary.
Fig. 5_Removing the external bleaching tray allows the internal bleaching tray to remain in position.
Fig. 6_Upper and lower bleaching trays in position with H_2O_2 in close contact with the teeth.


Fig. 4

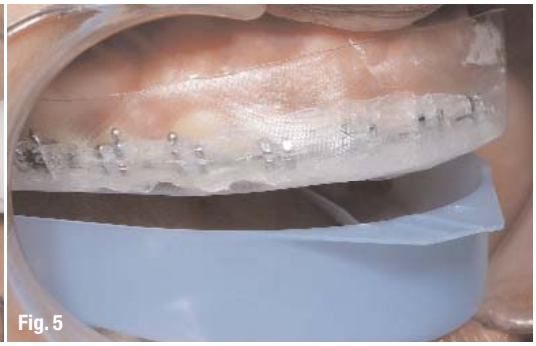
Fig. 5


Fig. 6


Fig. 7

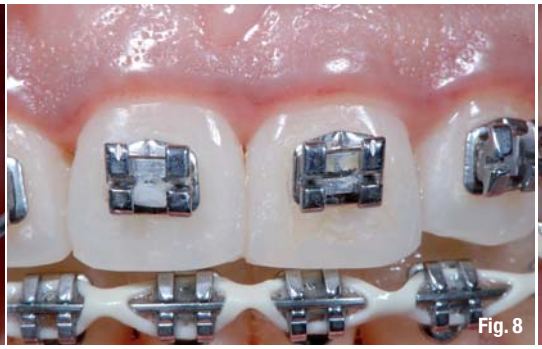
Fig. 8


Fig. 9

Patients under orthodontic treatment are convinced they must maintain their oral health regarding colour and aesthetics. Dentists and patients understand that there is the possibility of generating gingival irritations and dental pigmentation alterations caused by bacterial plaque accumulation around orthodontic devices, such as brackets, bands and arches, which adds to the process of decalcification and to long-term adverse factors, such as a poor oral hygiene. Conventional home care includes tooth brushing (mechanical or manual), irrigation devices, fluoride mouth rinses, topical fluoride applications and dental floss. But even with all this armamentarium, there is low motivation on behalf of patients.[5]

The vast majority of these devices and techniques used for oral health and hygiene are not implemented by the majority of patients that go at least twice per year to the dental office, and therefore benefits and results are not really significant. We should emphasise other alternatives that add to the above and that with patient awareness could help us improve the oral health of patients undergoing orthodontic treatment.

_Health and aesthetics

Oral health and hygiene are important factors to keep in mind for patients who are being treated with orthodontic devices; excellent oral hygiene is associated with the desire for appropriate dental aesthetics during and after treatment. By appealing to this desire for optimal aesthetics, we can implement parallel treatments that will maintain optimal periodontal health and at the same time protect teeth by increasing enamel micro-hardness and making teeth less decay prone. Owing to the new dental whitening that contains fluoride and potassium nitrate ions, this is possible.[5]

For these patients, we helped developed a product called Opalescence Treswhite Ortho (Ultradent, Opal Orthodontics) that prevents decalcification resulting from bacterial attack, which is responsible for carious lesions, and increases enamel micro-hardness.

Treswhite Ortho is applied with an entrenched external tray, which holds another very flexible one for home or in-office use, and is easily adaptable to teeth and brackets topography. This flexible tray contains an 8 % concentration of H_2O_2, fluoride and potassium nitrate. The flexible tray containing H_2O_2 should be kept on the brackets for 45 minutes in order to achieve adequate contact time between whitening gel, teeth and brackets. After each 45-minute daily session, the soft tray is easily removed from the mouth and discarded, and after that the patient removes any remnants of gel by brushing.

Treswhite Ortho is the first dental whitening method that works on fixed orthodontic devices and on preventing enamel demineralisation. The use of H_2O_2 for bacterial and plaque removal, and gingival tissue healing or scarring removal was proved more than 35 years ago.[6-9] Bacteria such

Fig. 7_After ten days of whitening treatment we started the removal of the orthodontic devices.
Fig. 8_Brackets over the teeth, ready to be removed.
Fig. 9_Notice teeth colour in the area in which the bracket was located after the first bracket is removed.


Fig. 10

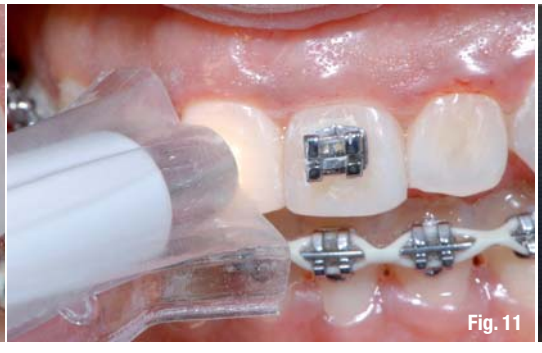
Fig. 11

Fig. 12

Fig. 10_Regular colour under bracket, no colour differences were found.
Fig. 11_Colour matching using the VITA Easy Shade spectrophotometer.
Fig. 12_Colour matched (B2) showing in the Easy Shade screen.

Fig. 13


Fig. 14


Fig. 15

Fig. 13_Colour matching using the VITA Classical (Lumin Vacuum).
Fig. 14_Final result after ten days' use of Treswhite Ortho and brackets removal.
Fig. 15_Patient smile shows uniform colour in all the anterior teeth.

as *Streptococcus mutants* and *Lactobacillus* are responsible for the white spot lesions caused by enamel demineralisation. Both types of bacteria are anaerobic, meaning that they need a dark, warm and oxygen-free environment to survive, because their organisms are unable to eliminate or detoxify in the presence of oxygen radicals.[10] Conversion of H_2O_2 to nascent oxygen causes tissue and oral environment oxygenation, and subsequently creates an inadequate environment for bacteria growth and reproduction.

_Overcoming reluctance

Many young and adult patients are reluctant to wear fixed orthodontic brackets because of their unattractive aesthetic appearance. Adequate oral hygiene is more difficult to achieve when wearing these devices, and after months or years of treatment, patients' teeth usually become dark or pigmented, thus increasing patient rejection of orthodontic treatments.

The use of pre-medicated, adaptable and malleable trays for home or in-office treatment is an excellent and easy way to offer patients the opportunity to have sparkling white teeth during orthodontic treatment.[11] Treswhite Ortho whitening power has a predictable benefit. H_2O_2 has a low molecular weight of 32 mg/m, which allows its easy diffusion through enamel to dentine.[12] Once it spreads to the dentine, oxygen molecules act upon the dark pigments rotating and fragmenting them, creating a whitening effect in the dental structure.[13] In addition, Treswhite Ortho H_2O_2 conversion to oxygen is highly beneficial for eliminating gingivitis, owing to the ability to provide the extra oxygen required during the high-oxygen consumption by the inflamed gingival tissues.[12,14]

H_2O_2 whitens poly-directionally inside the teeth, even underneath places covered by orthodontic devices such as brackets, making it possible to obtain homogeneous whitening on patients wearing orthodontic devices.[12] Patients are very receptive and keen to use this whitening product. Additionally, dental whitening increases the responsibility for maintaining a good oral hygiene.

An 18-year-old patient is more receptive to a treatment based on a dental whitening product than to brushing with fluoride toothpaste or using anti-plaque mouth rinses. This is quite evident when removing the soft Treswhite Ortho tray, since teeth must be vigorously brushed to remove the remnants of the viscous H_2O_2-based whitening gel. The result is chemical and mechanical removal of filaments and bacteria from the teeth surface and brackets.

As oral health professionals, we desperately seek to increase patients' awareness of functional, healthy and aesthetic orthodontic treatments. Treswhite Ortho is effective in removing bacteria and achieving enamel hardness, leaving patients with bright and sparkling teeth. But more importantly, it leaves teeth healthy and free of fissures. This type of result must form the basis for our new maintenance and care methodology for modern orthodontic therapies._

Editorial note: A complete list of references is available from the publisher.

_about the authors

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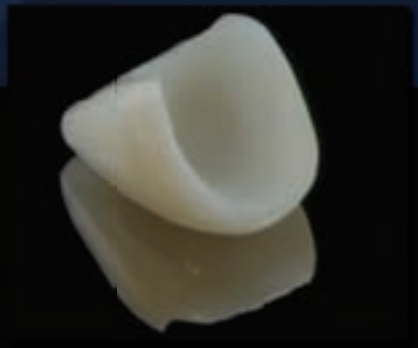

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Owing to its reduced flowability, GrandioSO Heavy Flow is well suited to all fillings that do not require elaborate sculpting. Its excellent material and handling properties make GrandioSO Heavy Flow superior to many packable composites. GrandioSO Heavy Flow is available in a non-run, non-drip NDT syringe in ten shades and as caps in five shades. GrandioSO and GrandioSO Heavy Flow may also be used in combination._

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BEAUTIFIL: GO WITH THE FLOW - COURSE: 3020

11:20 - 12:20 John Flucke, DDS
LIGHT CURED ADHESIVE DENTISTRY - SCIENCE AND SUBSTANCE - COURSE: 3030

1:20 - 2:20 Martin Goldstein, DMD
A SIMPLIFIED APPROACH TO MULTI- LAYER DIRECT COMPOSITE BONDING - COURSE: 3040

2:40 - 3:40 Jay Reznick, DMD, MD
3D IMAGING AND CT-GUIDED DENTAL IMPLANT SURGERY - 3050

4:00 - 5:00 Louis Malcmacher, DDS, MAGD
TOTAL FACIAL ESTHETICS FOR EVERY DENTAL PRACTICE - COURSE: 3060

MONDAY, NOVEMBER 29

10:00 - 11:00 Mrs. Noel Brandon-Kelsch
ECO-FRIENDLY INFECTION CONTROL-UNDERSTANDING THE BALANCE - COURSE: 4120

11:20 - 12:20 Gregori Kurtzman, DDS
INCORPORATING NEW ADVANCES IN DENTAL MATERIALS AND TECHNIQUES INTO YOUR RESTORATIVE PRACTICE - COURSE: 4130

1:20 - 2:20 Damien Mulvany, DDS
OPTIMIZING YOUR PRACTICE WITH 3D CONE-BEAM TECHNOLOGY - COURSE: 4140

2:40 - 3:40 Edward Katz, DDS
IMPROVING PATIENT CARE WITH 3D CONE BEAM COMPUTERIZED TOMOGRAPHY - COURSE: 4150

4:00 - 5:00 George Freedman, Fay Goldstep and Edward Lynch
SOFT TISSUE LASERS AND CARIES DIAGNOSIS - COURSE: 4160

TUESDAY, NOVEMBER 30

10:00 - 11:00 George Freedman, Fay Goldstep and Edward Lynch
SOFT TISSUE LASERS AND CARIES DIAGNOSIS - COURSE: 5110

11:20 - 12:20 Greg Diamond, DDS
LASERS IN PERIODONTAL THERAPY - COURSE: 5120

1:20 - 2:20 Dov Almog, DMD
INTRODUCTION TO CONE BEAM CT (CBCT), ESPECIALLY AS IT PERTAINS TO PREVENTION OF FAILURES IN ORAL IMPLANTOLOGY - COURSE: 5130

2:30 - 3:30 Maria Ryan, DDS, PhD
DETECTING CORONARY HEART THROUGH PERIODONTITIS AND PERIIMPLANTITIS - COURSE: 5140

4:00 - 5:00 Dwayne Karateew, DDS
CONTEMPORARY CONCEPTS IN TOOTH RELACEMENT: PARADIGM SHIFT - COURSE: 5150

WEDNESDAY, DECEMBER 1

10:00 - 11:00 Mr. Al Dube
BEST MANAGEMENT PRACTICE, WASTE MANAGEMENT FOR THE DENTAL OFFICE, AND OSHA COMPLIANCE - COURSE: 6060

11:20 - 12:20 Glenn van As, DMD
HARD AND SOFT TISSUE LASERS - COURSE: 6070

12:45 - 4:45 Dr. Benedict Bachstein, Dr. David Hoexter, Dr. Jeffery Hoos, Dr. Dwayne Karateew, Dr. Enrique Merino, Dr. Ethan Pansick
THE FIRST ANNUAL OSSEO UNIVERSITY SUMMIT: IMPLANT DRIVEN DENTISTRY - COURSE: 6080

THIS PROGRAM IS SUBJECT TO CHANGE

DENTAL TRIBUNE
DT STUDY CLUB
COURSES | DISCUSSIONS | TECHNOLOGY | ON-DEMAND

International Events

2010

Dental-Facial Cosmetic International Conference
Where: Dubai, UAE
Date: 5 & 6 November 2010
E-mail: info@cappmea.com
Website: www.cappmea.com

Veneersymposium
Where: Leipzig, Germany
Date: 5 & 6 November 2010
E-mail: event@oemus-media.de
Website: www.oemus-media.de

DGÄZ Annual Meeting
Where: Rottach-Egern, Germany
Date: 19 & 20 November 2010
E-mail: info@dgaez.de
Website: www.dgaez.de

Greater New York Dental Meeting
Where: New York, NY, USA
Date: 26 November–1 December 2010
Website: www.gnydm.org

2011

IADR General Session & Exhibition
Where: San Diego, CA, USA
Date: 16–19 March 2011
E-mail: sherren@iadr.org
Website: www.iadr.org

International Dental Show
Where: Cologne, Germany
Date: 22–26 March 2011
E-mail: ids@koelnmesse.de
Website: www.ids-cologne.de

AACD Boston 2011
Where: Boston, MA, USA
Date: 18–21 May 2011
E-mail: pr@aacd.com
Website: www.aacd.com

EAED Spring Meeting
Where: Istanbul, Turkey
Date: 2–4 June 2011
E-mail: info@eaed.org
Website: www.eaed.org

IACA 2011
Where: San Diego, CA, USA
Date: 28–30 July 2011
E-mail: info@theiaca.com
Website: www.theiaca.com

AAED Annual Meeting
Where: San Juan, Puerto Rico
Date: 2–5 August 2011
E-mail: meetings@estheticacademy.org
Website: www.estheticacademy.org

FDI Annual World Dental Congress
Where: Mexico City, Mexico
Date: 14–17 September 2011
E-mail: congress@fdiworldental.org
Website: www.fdiworldental.org

IFED World Congress
Where: Rio de Janeiro, Brazil
Date: 21–24 September 2011
Website: www.ifed.org

submission guidelines:

Please note that all the textual components of your submission must be combined into one MS Word document. Please do not submit multiple files for each of these items:

_the complete article;
_all the image (tables, charts, photographs, etc.) captions;
_the complete list of sources consulted; and
_the author or contact information (biographical sketch, mailing address, e-mail address, etc.).

In addition, images must not be embedded into the MS Word document. All images must be submitted separately, and details about such submission follow below under image requirements.

Text length
Article lengths can vary greatly—from 1,500 to 5,500 words—depending on the subject matter. Our approach is that if you need more or less words to do the topic justice, then please make the article as long or as short as necessary.

We can run an unusually long article in multiple parts, but this usually entails a topic for which each part can stand alone because it contains so much information.

In short, we do not want to limit you in terms of article length, so please use the word count above as a general guideline and if you have specific questions, please do not hesitate to contact us.

Text formatting
We also ask that you forego any special formatting beyond the use of italics and boldface. If you would like to emphasise certain words within the text, please only use italics (do not use underlining or a larger font size). Boldface is reserved for article headers. Please do not use underlining.

Please use single spacing and make sure that the text is left justified. Please do not centre text on the page. Do not indent paragraphs, rather place a blank line between paragraphs. Please do not add tab stops.

Should you require a special layout, please let the word processing programme you are using help you do this formatting automatically. Similarly, should you need to make a list, or add footnotes or endnotes, please let the word processing programme do it for you automatically. There are menus in every programme that will enable you to do so. The fact is that no matter how carefully done, errors can creep in when you try to number footnotes yourself.

Any formatting contrary to stated above will require us to remove such formatting before layout, which is very time-consuming. Please consider this when formatting your document.

Image requirements
Please number images consecutively throughout the article by using a new number for each image. If it is imperative that certain images are grouped together, then use lowercase letters to designate these in a group (for example, 2a, 2b, 2c).

Please place image references in your article wherever they are appropriate, whether in the middle or at the end of a sentence. If you do not directly refer to the image, place the reference at the end of the sentence to which it relates enclosed within brackets and before the period.

In addition, please note:

_We require images in TIF or JPEG format.
_These images must be no smaller than 6 x 6 cm in size at 300 DPI.
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Larger image files are always better, and those approximately the size of 1 MB are best. Thus, do not size large image files down to meet our requirements but send us the largest files available. (The larger the starting image is in terms of bytes, the more leeway the designer has for resizing the image in order to fill up more space should there be room available.)

Also, please remember that images must not be embedded into the body of the article submitted. Images must be submitted separately to the textual submission.

You may submit images via e-mail, via our FTP server or post a CD containing your images directly to us (please contact us for the mailing address, as this will depend upon the country from which you will be mailing).

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Abstracts
An abstract of your article is not required.

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The author's contact information and a head shot of the author are included at the end of every article. Please note the exact information you would like to appear in this section and format it according to the requirements stated above. A short biographical sketch may precede the contact information if you provide us with the necessary information (60 words or less).

Questions?
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