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Clinical digital dental photography

research
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Dear Reader,

It is my pleasure to welcome you to this year’s third issue of CAD/CAM!

As the organiser, I am pleased to invite you to the first Asia Pacific edition of the seventh CAD/CAM & Computerized Dentistry International Conference in Singapore from 6 to 7 October 2012. I am very excited to be involved in the organisation of such an event, which has built extremely important bridges between the dental team, dental technicians and industry. We look forward to an amazing weekend at the Marina Bay Sands Hotel in Singapore.

The main scientific conference (6-7 October) and the dental technicians’ parallel session (7 October) will cover the latest trends and developments in digital dentistry. The impressive two-day programme will see 20 international speakers giving expert cutting-edge presentations to the 400 expected dentists, dental technicians and other dental professionals, all hungry for knowledge from Asia Pacific, Europe and the Middle East. Participants will also have direct contact with 25 industrial players in a networking environment, creating a forum for discussions, questions and the exchange of valuable feedback, while viewing the latest technologies at the exhibition.

Only six years ago, when the Middle Eastern market was still in its early stages we held the first CAD/CAM & Computerized Dentistry International Conference in Dubai with enthusiasm and confidence in this exciting field. We are confident that we will be able to transfer this concept to the Asia Pacific region successfully and play a significant role in the development and improvement of digital dentistry.

Similar to Dubai, Singapore is a commercial hub for the entire region. In addition, the digital dental industry in Asia is growing tremendously rapidly. Increasing demand for higher quality restorations, for example, has boosted purchases of CAD/CAM solutions. Continuous growth in the privatisation of hospitals, the expansion of dental clinics and the ageing population has resulted in CAD/CAM paving the way forward for dentistry, offering improved accuracy and efficiency. These developments have created the need for dentists to further develop their skills and knowledge in digital dentistry in order to keep up with the latest tools provided by the industry for their benefit.

Looking to the future, it is inevitable that digital dentistry will become standard in all dental clinics in both Asia and the rest of the world. Industry forecasts for Asia estimate double-digit growth in the CAD/CAM market for the next few years.

For these reasons, I would like to invite all dental professionals to the largest annual international event focused entirely on computerised dentistry. I look forward to seeing you in the vibrant city of Singapore!

Yours faithfully,

Tzvetan Deyanov
Business Development Manager
CAPP Asia
Dear Reader

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Clinical digital dental photography

Author_ Dr Amit Patel, UK

Over the past decade, the availability of digital photography, digital imaging systems and digital presentation software programs has revolutionised teaching and lecturing.

Before the advent of digital photography, it was expensive to purchase dedicated 35 mm dental photographic equipment and accessories, and it was more likely to be dentists who were also amateur photographers who bought such equipment. Since the development of digital cameras, the costs have been brought down quite considerably. This has made it more accessible for most dentists in their everyday practice. The main advantages of digital versus film photography are instant image acquisition, reduced costs of film processing and a relatively easy learning curve.

It is very difficult to outpace technology, as it is evolving daily at a rapid rate and one will always be behind. So don’t plan on using your current digital equipment for the rest of your life; it is always outdated within a couple of years. Over time as our own skills and knowledge improve with digital pho-

In today’s environment of patient’s high expectations and increased litigation, especially with regard to cosmetic dentistry, good record-keeping is essential. Clinical photography is a very important tool in general practice in documenting treatment, especially in aesthetic and cosmetic cases.

Clinical photography and academic presentation have undergone a transformation over the past ten years. In the past, clinical slide photography and carousel slide lecture presentations were the gold standard in both dentistry and the medical fields.

Fig. 1a & b, Canon EOS 40D 105 mm lens with ring flash and dual flash lighting systems (SLR).

Fig. 2, Nikon Coolpix 4500 (point and shoot).

Fig. 3, Nikon Coolpix 4500 with ring light (point and shoot).
Digital photography, we will want to improve on our old images; therefore, reinvesting in technology is part of the challenge in the pursuit of excellence.

One of the biggest advantages of digital photography is that the images can be viewed instantly and can be edited in many ways, such as improving brightness and contrast, cropping, changing hue and saturation, adding text and symbols, using software.

**Types of cameras**

Digital SLR (single-lens reflex) cameras are high-end cameras designed for semi-professionals to professionals (Figs. 1a & b). Recently, most of the major camera brands have developed a range of affordable DSLRs, allowing us to develop our clinical photography skills over time to achieve higher standards in our practice.

DSLR cameras have the advantages of interchangeable lenses, including macro and telephoto, metered lenses, and ports for accessory flashes, such as a ring flash or a dual flash system. One can also choose between manual focus and autofocus cameras. Although the modern camera can control a number of key settings relating to the exposure and flash levels, these can normally be set manually.

These types of cameras can be expensive and bulky to use for clinical photography. A good number of the point-and-shoot style of digital cameras are available at reasonable prices and take excellent clinical photographs even at a macro level. I have been using a Nikon Coolpix 4500 (Figs. 2 & 3) since 2003, which allows macro images up to 2 cm from the object and with which I have obtained good results (Figs. 6–14).

The advantages of the smaller point-and-shoot style cameras over DSLRs is that they are less bulky, lightweight and compact, and work well for most clinical cases. There is also no need for multiple lens changes.

**Digital camera jargon**

Digital cameras capture images as elements, known as pixels. A megapixel is equal to one million pixels. The more pixels contained in an image, the higher the image resolution. Resolution relates primarily to print size and the amount of detail in an image when viewed on a computer monitor at 100 per cent magnification.

Images with more megapixels yield better print images. Many amateur and professional digital photographers crop their photographs, sometimes reducing them dramatically in size, to focus on the key element of the image. Obviously, the more pixels in an image, the more can be cropped while retaining a useful image.

I consider that six megapixels is sufficient for use in clinical digital photography. It gives one the
special digital photography

ability to use the images for presentation to patients and for lectures using software such as Microsoft PowerPoint (www.microsoft.com) or open-source software that can be obtained from the Internet, such as OpenOffice (www.openoffice.org), and to print reasonable size images (300 x 450 mm) for poster presentations.

The images are stored on a CompactFlash card (CF card) or Secure Digital card (SD card), for example. There are many file types (RAW, JPEG and TIFF) that all serve different purposes. A RAW file is comparable to the latent image contained in an exposed but undeveloped piece of film. This means that the photographer is able to extract the maximum image quality possible, whether now or in the future. This format is mostly used in professional photography.

A JPEG file is a file that is compressed and when saved loses its quality. This results in a lower quality and smaller image file. For many applications, the image quality is more than sufficient. The smaller files also make it easier to transmit electronically. A TIFF file is also compressed but the file does not lose quality upon being saved; therefore, TIFF files are larger than JPEG files. TIFF format images can be utilised in presentation software, the only drawback being that the software may run more slowly owing to a larger file format. I am inclined to use the JPEG Fine format to save the images, as they are easily transferred to the computer and can be used for presentation purposes.

Standardising images

It has never been easier to take standardised photographs and use high-quality controlled clinical images. Focal distance can be standardised by securing a piece of dental floss or chain to the bottom of the camera and holding it near an appropriate area (chin) of your patient. This ensures that you will be at the same distance from the patient for all views.

For macro photography, a macro lens and ring flash for a DSLR can be used for capturing close-up images of the subject. Ring lights (usually a ring of LEDs fixed to the lens) can also be obtained for most point-and-shoot cameras (Fig. 3). It is not always essential to have all these accessories, as you do not need to get close to the subject. These cameras automatically compensate for various lighting conditions and some can compensate for macro distances.

Getting too close will overexpose some areas and block the flash in other areas, causing shadows. The best technique is to keep away from the subject and use the optical zoom to get close to the area. By doing this, you are far away enough for the flash to disperse over a larger area. With digital editing, you can crop any extraneous anatomy. If the image is taken at a high resolution, your image will be of sufficient magnification after cropping the unwanted structures (macro-like).

Basic functions

There are four exposure settings (modes) in the majority of DSLR cameras and all employ a through-the-lens metering system:

Aperture priority

The aperture is the lens opening. So the aperture control allows the photographer to
control how far the lens is opened when a picture is taken. The farther the lens is opened, the greater the amount of light that is allowed into the camera and the lighter the exposure. Once the aperture value has been selected, the camera automatically selects the correct shutter speed to produce an acceptable exposure. By setting the aperture value, the photographer decides on the depth of field (the plane of sharp focus) in the image. One can select a small aperture value (a high f-number) for a larger plane of sharp focus (Fig. 4) and a large aperture value (a small f-number) for a narrow plane (Fig. 5).

A depth of field problem is that the entire dentition can only be photographed completely in sharp focus if the focal plane is positioned carefully. Therefore, do not focus on the anterior teeth (yellow circles on Fig. 4). For a frontal view, the point of focus should be around the canines (yellow circle on Fig. 5).

**Shutter priority**

The shutter speed controls the amount of light that enters the lens when the picture is taken. The more light desired, the slower the photographer should set the shutter speed. Once the shutter speed has been selected, the camera automatically selects the correct aperture value to produce an acceptable exposure. This mode is not used for the purpose of intra-oral photography.

**Program**

The camera automatically selects both the aperture and shutter speed based on a built-in program.

**Manual**

The photographer selects both the aperture and shutter speed, but the camera's built-in meter can still be used to calculate the correct exposure.

For dental photography, it is important to be in control of the exposure features. Therefore, either the aperture priority or manual exposure settings are preferable.

**Accessories for intra-oral photography**

Cheek retractors and intra-oral photography mirrors are essential tools for dental photography (Table I). Using these tools allows us as clinicians to teach and improve team involvement of all the staff. I feel that it is important to delegate the process of intra-oral photography to other members of staff; therefore, it is essential to teach and emphasis the standardisation of all the images taken so that any member of staff trained will achieve the high standards required.

Orientation of the image is important. The occlusal plane should run parallel to horizontal frame of the photograph through the view-finder, as a photograph taken from below will distort and alter the perspective of the teeth. Lateral photographs should be taken perpendicular to the teeth using a mirror (Figs. 7, 8 & 11a). Lateral photographs without mirrors will only show a few teeth, as the metered focus will be on the canines and first premolars (Fig. 11b). For occlusal views, the camera should be as near as perpendicular to the occlusal mirror (Figs. 9 & 10).

**Tips for dental photography**

- Use cheek retractors;
- Use dental photography mirrors (warm using the three-in-one to remove fogging and saliva bubbles);
- If the image is too bright, increase the f-number (reduce aperture size);
- If the image is too dark, decrease the f-number (increase aperture size);
- Take as many photographs as you like, as you can delete them later.

**Tips for dental presentations**

- Use the crop tool to remove cheek retractors;
- When using presentation software, use a black or white background for your images;
- Don’t use too many transitions, as this can be distracting to the audience;
- Definitely don’t use any sound effects.

**Recommended digital SLR cameras and their settings for intra-oral photography**

<table>
<thead>
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<th>Camera</th>
<th>Nikon DSLR</th>
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<th>Nikon DSLR</th>
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<td>Sigma ring flash</td>
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<td>Power setting</td>
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<td>Aperture value</td>
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<td>F25</td>
<td>F25</td>
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<tr>
<td>Shutter speed</td>
<td>1/160</td>
<td>1/125</td>
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When taking images of isolated teeth, one way of improving the image is by using a black background (contraster). The black background improves the image quality and highlights the translucent regions of the teeth (Figs. 12 & 13).

**Radiographs**

Taking images of plain film radiographs can be difficult. The film is placed on an X-ray viewer box and the image is then taken. In most cases, there will be a greyish green cast to the image. This is due to the fluorescent light in the X-ray viewer that produces flicker at the mains frequency. Essentially, when the image is taken, the fluorescent light may be flickering on or off, thereby affecting the colour of the image (Fig. 14a).

There are many complicated ways of overcoming the colour cast, but we have found two methods that appear to achieve the desired results more easily. The image can be manipulated to produce a black and white image (Fig. 14b) using bought software such as Adobe Photoshop (www.adobe.com) or using open-source software such as GIMP (www.gimp.org). The second technique—and the easiest—is to set the digital camera to capture images in black and white (Fig. 15).

**Presentation software**

For presentations, I use OpenOffice. It is virtually the same as Microsoft Office; the only difference is that you can save the documents in any format available, such as those used by Microsoft Word and Google Docs. OpenOffice offers a program called Impress that is equivalent to PowerPoint. I like to use a black or a white background for my slides, as this makes the images more prominent on the slides (Fig. 16; Table II).

These presentations are used both for patients as an education tool and for lecturing purposes. I also find it useful to take a photograph of the nearest shade tabs to the adjacent tooth so that all information available can be sent to the laboratory technician (Fig. 17). The image is sent as either a JPEG or an OpenOffice Impress file to the laboratory. The technician will be able to use the image to create a restoration with the correct shade and characterisation. I also use the images taken pre- and post-operatively of any restorative and implant work and supply the images to the dental technician, as rarely do technicians see their own handy work in situ.

I also use another open-source program (GIMP) to manipulate the images, that is to crop out any unwanted distractions, such as the retractors (Figs. 18 & 19; Table III). Using this software, it is possible to reorientate the image if not level with the horizontal plane using the rotation tool. The image is simply saved and imported into the presentation program.

**Conclusion**

According to Moore’s law, the number of transistors in integrated circuits has doubled every year since the invention of the integrated circuit. Moore predicted that this trend would continue. It is thus evident that by the time this article goes to print, camera technology will have made further advancements, but the principles of capturing an image will remain the same. Observing the simple rules to ensure standardised images will allow all members of the dental team to obtain good quality images. An important consequence of digital dental photography is the ability to check and improve the images.

Interestingly, whilst writing this article, the World Mobile Congress was held in Barcelona in February 2011. Many tablet computers were showcased at this event (Fig. 20a–c). The use of these newer tablets in everyday practice is an important patient education tool. One’s images can be archived on the tablet and imported into presentation software, making it more patient friendly. The tablet can then be used by the dental team to educate patients. It is important to be aware that dental photography is an essential part of dentistry used not only to document, but also to illustrate and educate. 

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

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**about the author**

Dr Amit Patel
Specialist in Periodontics & Implant Dentist, Associate Specialist Birmingham Dental Hospital, Honorary Clinical Lecturer University of Birmingham School of Dentistry
The correct physiological recovery of the occlusion poses a major challenge for every dentist and technician. Even the smallest high spot, measuring just a few microns, can cause dysfunction in patient’s masticatory system. In restorative dentistry, occlusal proportions are constantly changing. It is therefore essential, for the benefit of the patient to understand and monitor the function of teeth in static and dynamic occlusion. Functional occlusion is important for the overall health of the patient. The interdisciplinary verification of symptoms and treatment is an integral part of daily practice. Therefore, checking the occlusion with the correct material during treatment is highly recommended. For further information you are welcome to visit our website and our latest App „Dentalnavigator“ which is available for iPhone and iPad.
“Lecture theatre” — a new interactive concept — on chairside CAD/CAM dentistry

An interview with Dr Michael Dieter, Ivoclar Vivadent, Liechtenstein

To be held for the first time in South-East Asia, the seventh CAD/CAM & Computerized Dentistry International Conference in Singapore in October will offer a detailed overview of the latest CAD/CAM technologies that are aimed at helping dentists achieve aesthetic and long-lasting all-ceramic restorations chairside. During a presentation in Cape Town, South Africa, CAD/CAM had the opportunity to speak with Ivoclar Vivadent’s Dr Michael Dieter, head of the International Center for Dental Education, who will be hosting the lecture theatre together with Jörg Vogt, international CEREC trainer for Sirona.

CAD/CAM: Dr Dieter, your joint presentation with Mr Vogt in Singapore will be held in form of a lecture theatre. What is behind this concept?

Dr Michael Dieter: Jörg Vogt and I developed this concept two years ago. When the organiser’s managing director, Dr Dobrina Mollova, saw our performance at the sixth CAD/CAM & Computerized Dentistry International Conference in Dubai last year, she named it a “lecture theatre” because of its truly interactive nature. Jörg and I present in continuous dialogue with each other, which makes the lecture more interesting, not only for the audience but also for us. Additionally, case demonstrations with the CEREC AC will be performed live on stage.

Primarily, our lecture is aimed at dentists who are interested in minimally invasive aesthetic treatment solutions or who simply want to get into dental CAD/CAM technology. Our goal is to provide a predictable guideline for the clinical treatment sequence using chairside CAD/CAM technology. However, the lecture is also suitable for any dentist who is interested in all-ceramics as a modern restorative treatment option.

From my experience, I can say that many practitioners still have little knowledge of what all-ceramic material they are supposed to use for various clinical situations. With our lecture theatre, we aim to demonstrate the main differences in terms of aesthetics, particularly for use in the anterior dentition, and the physical properties or strength of the various all-ceramic systems.

What do you think the reason is for this lack of knowledge?

If we look at the increasing number of all-ceramic systems on the market that manufacturers claim to be aesthetic, we can in fact perceive significant differences. The questions remain: what does “aesthetic” mean, and how suitable are these materials in clinical reality? This is exactly what we will be discussing in our lecture: translucency, opalescence and fluorescence — these optical properties of the natural tooth can be reproduced in the patient’s mouth with select modern all-ceramic materials.

While I will focus on the treatment sequence from a clinical perspective, Mr Vogt will provide insights into the CAD/CAM process using the CEREC AC and the latest software (version 4.03). He will demonstrate live, step-by-step, how to design the restorations and I will illustrate the related clinical cases.

What are the most common mistakes when choosing materials?

Selecting the right material is not the only difficulty. The correct tooth-preparation technique remains a challenge for many dentists because all-ceramics require an entirely different preparation design compared with the commonly used metal alloys or metal ceramics. If mistakes are made at the beginning, fracture of the restoration becomes much more likely. Therefore, preparation techniques for all-ceramics with regard to CAD/CAM application will be in focus as well.
What impact has CAD/CAM technology had on the usage of aesthetic restorations in the dental practice?

With CEREC, CAD/CAM technology has been available for chairside application for more than 27 years. So this is a well-documented procedure with long-term clinical success. Today, there are approximately 34,000 CEREC units in use, which demonstrates impressively that this technology is still driving aesthetic dentistry in the clinical practice. The main indications are inlays, onlays, partial crowns, full crowns and veneers. In addition, up to four-unit posterior bridges are now possible, either as a temporary solution with polymer blocks (e.g. Telio CAD, Ivoclar Vivadent) or as a permanent restoration with a high-strength zirconium dioxide/lithium disilicate material (e.g. IPS e.max CAD-on, Ivoclar Vivadent).

What are the aesthetic limitations of chairside CAD/CAM?

Generally, posterior restorations like inlays, onlays and crowns can be realised with good aesthetic results. With anterior restorations like crowns and veneers, the aesthetic outcome largely depends on the adjacent teeth that we have to match intra-orally. Highly aesthetic colour gradients for CEREC restorations can be achieved with polychromatic blocks (e.g. IPS Empress CAD Multi, Ivoclar Vivadent) or by shading and staining monochromatic lithium disilicate blocks (e.g. IPS e.max CAD, Ivoclar Vivadent).

All this can be carried out by the dentist chairside. If the adjacent teeth show visible internal structures like mamelons, dentists need the support of dental lab technicians to optimise aesthetics—this represents the aesthetic limitation of chairside CAD/CAM.

Have restorations become more complex with chairside CAD/CAM?

On the one hand, yes, the procedure has become somewhat more complex because the dentist is also responsible for the design, milling and surface finishing of the restoration. On the other hand, impressions and temporaries are no longer necessary, which makes life easier for both the dentist and the patient.

What are the critical factors for achieving successful long-term clinical outcomes?

In addition to the factors described above, cementation, particularly for glass-based ceramic restorations, is a clinical step of paramount importance for long-term clinical success, since it is directly linked to the aesthetic outcome and the fracture strength of the final restoration. Which ceramics have to be bonded? Which ceramics can be cemented conventionally? How does one prevent post-operative sensitivity after cementation? All these questions will be answered in detail during the lecture.

Many speak of CAD/CAM technologies as the next revolution in dentistry. Do you agree?

I would say that the revolution will continue. I am still fascinated by the materials and the manufacturing process. All-ceramic restorations are not only aesthetically pleasing but also minimally invasive. Therefore, patients benefit not only from better looking teeth, but also from the fact that much less natural tooth substance has to be removed compared with traditional restorative techniques and materials.

The next few years will show what CAD/CAM manufacturers have kept in reserve, both chairside and labside. Materials manufacturers like Ivoclar Vivadent will continue to develop highly aesthetic and user-friendly all-ceramic systems that aim to further reduce the minimum material thickness—requiring even less invasive tooth preparations—to the benefit of the patient.

Thank you very much for this interview.

“...cementation is a very important factor and still underestimated by many dentists.”
The implant-retained bar overdenture: The SFI-Bar

Author: Dr. Tussavir Tambra, United Kingdom

Introduction

The advent of CAD/CAM technology and the more widespread utilisation of implants in modern dentistry have led to an explosion of treatment solutions designed to address any situation encountered by the general dentist. As patients have become more aware of the benefits of implant therapy, they have begun to demand more immediate restoration of their teeth. The provision of a fixed prosthesis has always been the goal in dentistry; however, the cost of such treatment is pricing the vast majority of patients out of the implant market. Immediate loading, avoiding conventional grafting techniques by placing implants at various angulations (All-on-4, Nobel Biocare; Columbus Bridge, BIOMET 3i), has resulted in a significant uptake of treatment by edentulous patients and those with a failing dentition. This is mainly because a fixed bridge is provided and treatment times are reduced from months to hours, avoiding a conventional denture.

Most edentulous patients can tolerate a complete maxillary denture with few problems. The vast majority of problems arise in the mandible, where the underlying supporting tissues are not designed to function under this type of occlusal loading. Even a properly constructed complete lower denture can move as much as 10 mm in function. This continuous movement of the prosthesis results in loss of the supporting bone (or remodelling), further destabilising the denture. Poor ridge form increases denture instability and this produces more remodelling. Edentulism fulfils the WHO definition of a physical impairment.

Treatment protocol

A simple treatment protocol was devised to treat this problem. According to this protocol, two dental implants are placed in the inter-foraminal area of the mandible, to which either a bar or stud attachments are connected to retain the lower denture. This treatment greatly improves both masticatory efficiency and function in patients. Over the last two decades, attempts have been made to render the implant-retained overdenture the standard treatment for edentulism, as demonstrated most recently by the McGill consensus.

Prosthetic failure, usually loss of retention, and the technical difficulties encountered when relining or changing stud attachments proved to be major negative factors in dentists’ attitudes towards this treatment modality. Several attempts were made to redesign and improve the attachments; however, owing to previous negative experiences, most dentists became reluctant to adopt implant-retained overdentures as a routine treatment option. The push to place more implants in an attempt to improve the situation led to the bar- and clip-retained overdenture scenario. This technique was more successful but still encountered similar issues to the stud-attachment overdentures.
Poor stress transmission from the prosthesis to the supporting implants results in bone loss around the implants (especially the most distal implants in the multiple bar scenario), in addition to prosthetic and surgical complications. This resulted in implant companies and clinicians moving away from the two implant-retained overdenture treatment option in favour of fixed solutions, such as round-house bridges fixed on four or more implants. As a result, the vast majority of patients cannot access implant therapy owing to financial constraints. The McGill consensus brought the implant-retained overdenture back into the spotlight as a way of increasing access to implant dentistry and improving patients' quality of life. Improved component manufacturing techniques, and greater care and attention to both surgical and restorative treatment planning have significantly improved treatment outcomes using overdentures.

Recently Cendres+Métaux introduced the Stress Free Implant Bar, or SFI-Bar, to the dental community. This unique, implant-platform-independent restorative bar overdenture solution allows the fabrication of a true passive-fit bar and clip system on two or more implants (Fig. 1). Finite element studies and clinical evaluation of the system have found minimal stress transmission from the prosthesis to the implants under loading (Figs. 2a–c), with most stresses being evenly distributed between the supporting implants. Vertical loads are transmitted effectively to the supporting implants, while undesirable lateral stresses are largely eliminated. More recent clinical studies have also shown it to be a viable immediate-loading treatment solution. The technique is in its infancy, so long-term (five years or more) data is not available. The SFI-Bar is a modular system that connects multiple dental implants with no soldered or laser-welded joints.

The minimum inter-implant distance is 8 mm and the maximum is 26 mm. This is an expandable bar system, in which add-on kits (Fig. 3) can be used to incorporate multiple implants to create a round-house bar. Implant adapter abutments are first torqued onto the implants (Figs. 4a & b). They form one half of a universal ball joint—the other half being incorporated into the bar element. The bar itself is formed by a hollow tube bar that fits onto the end of each ball joint (Fig. 5). This tube bar is cut to the correct length using a specialised jig and cutting disc (Figs. 6a–c). The jig is designed to mimic a ball joint connection, ensuring a perfect section each time. The jig slides along the tube bar until it reaches the implant adapter, accurately sizing the bar. The tube bar is then locked in place and cut to size with a cutting disc (Fig. 6c). This process can be carried out either chair side (two-implant bar) or in the laboratory (four-implant bar or larger). An implant-level master cast will be...
required for cutting in the laboratory. The cutting of the tube bar must always be carried out extra-orally. The cutting of the tube bar must always be carried out extra-orally.

Once the tube bar has been cut, the ball joints are inserted into each end of the tube bar prior to seating on the implant adapters (Figs. 7a–d) and torqued into place. The SFI-Bar is now complete and the patient is ready for the retentive element to be housed in the denture. The ball joints can accommodate non-parallel implant placement up to a maximum of 15° angulation correction. The absence of any soldered or welded joints means that a greater length of the bar can be engaged by the retentive clip. In conventional techniques, the presence of a weld increases the bar thickness, at that point preventing any retentive clip engaging that area. In the SFI-Bar, the clip engages the full length of the bar between the ball joints (Fig. 8). The bar assembly must be parallel with the occlusal plane; therefore, a selection of implant adapters of varying lengths should be available.

Most of the major implant companies offer CAD/CAM-fabricated bar and clip solutions. However, these bars are relatively expensive and are fabricated through a conventional impression and master cast technique. Studies have shown that 50% of all errors during impression making and cast fabrication result in non-passive fit of bars and frameworks. Thus, any bar fabricated through an impression or cast technique cannot be truly passive. A clinical case will be presented below in order to demonstrate the direct chair-side method and the use of the SFI-Bar on two implants to restore an edentulous mandible. In addition, the main points for use with the indirect method will be outlined.

_Case presentation_

In 2006, a 60-year-old female patient initially presented, complaining of an ill-fitting lower denture. The patient had worn a conventional complete mandibular denture for over 20 years, opposing a metal-based maxillary removable partial denture. The patient had visited a denturist on several occasions to try to improve the situation. After multiple relining procedures, the patient decided to seek expert help. An OPG radiograph revealed a severely resorbed mandible that clinically presented as a classic bowl-shaped deficiency (Figs. 9a–c). Radiographic examination revealed there was adequate bone volume in the anterior region for the placement of dental implants. However, a fixed solution would only have provided a shortened dental arch, as the mental foramen had become more mesial owing to bone resorption. Placing implants distal to the mental foramen was not an option, owing to the proximity of the inferior dental nerve and lack of bone height. The patient was not keen to have any nerve repositioning or complex bone grafting. Another important factor negating the fixed solution was the size of the volume defect. This would have been difficult both to correct and to maintain and would have produced a poor aesthetic result. The additional bulk of denture flanges allowed proper facial support.

After discussing all the relevant issues, the patient decided that the removable overdenture retained with two implants was the best and least complicated treatment option for her. The upper denture was not an issue for the patient, as it was retentive and stable. In order to limit costs, the upper denture was not replaced. A surgical guide was fabricated after the vertical dimension, aesthetic and phonetic paramet-
ters had been corrected in the wax denture try-in. Two 4.1 mm RN connection dental implants (Straumann), each 8 mm in length, were placed in sites #32 and #42 (Figs. 7a & 9b). These were allowed to integrate for three months prior to the provision of a ball-abutment-retained overdenture. This denture functioned without surgical or prosthetic issues for a five-year period. Unfortunately, the patient revisited her dentist and complications arose after an attempted intra-oral relining procedure. On examination, it was determined that the ball abutments were damaged and needed to be replaced. The female housings needed to be replaced, as they were no longer seated properly on the ball abutments.

The patient was then given the option of having either another ball-abutment-retained overdenture or a bar- and clip-retained overdenture instead. The patient opted for the bar and clip overdenture. The first step was to remove the damaged ball abutments and seat the appropriate implant adapters on each implant (H1 adapters of 1 mm in length; Figs. 4a & b). The tube bar was then inserted into the cutting tool and cut to correct length using the cutting disc (Figs. 6a–c). The bar assembly was then connected to the implant adapters and torqued into place. The universal nature of the ball joint allows the tube bar to be located in the horizontal plane in a truly stress-free alignment (Figs. 2a–c & 7b–c).

The implant adapters were chosen so that when the bar is seated it is parallel to the occlusal plane, with at least 1.0 mm clearance between the underside of the bar and the mucosal tissues (Fig. 7b). This allows access for effective oral hygiene procedures around the dental implants and reduces the risk of tissue hyperplasia around the bar when the denture is seated. From a surgical perspective, ridge reduction procedures may be required firstly to aid ideal implant placement and secondly to ensure there is enough space to fabricate the final denture to be seated on the bar assembly. If multiple implants are used, adapters with a range of lengths should be used. Multiple implants are more difficult to place parallel to each other, but the ball joints can accommodate up to 15° of implant divergence. Surgical complications are seen more commonly in bar and clip overdentures than stud-attachment overdentures. Clinically, the whole procedure took six minutes, from removing the ball abutments to torquing the bar assembly into place.

The ball-abutment-retained denture was then hollowed out so that it could be seated over the bar assembly and used as a provisional while the new definitive denture was being fabricated. A custom tray was used to make a border-moulded final impression with Impregum (3M ESPE), after blocking out the bar assembly (Fig. 10). A wax occlusal rim was then used to determine the vertical dimension of the occlusion and obtain a CR record. This was followed by a full wax try-in to ensure that all the aesthetic, phonetic and occlusal parameters were correct. At this point, the denture
was ready to be processed. The denture is processed in one of two ways:

In the laboratory technique, the female part T (made from pure Grade 4 titanium) is integrated into the denture and a complete prosthesis is returned to the clinic. Part T is contra-indicated for use on two implant bars (Figs. 11a & b).

In the chairside technique, the denture is processed and a window is cut in the denture, through which the dentist can pick up the female part E (made from Elitor—68.6 per cent gold alloy), using self-curing acrylic resin in the patient’s mouth after seating the spacer and blocking out all undercuts (Fig. 10).

The total width of the bar with the E clip seated is 4.3 mm (Fig. 12) and 3.6 mm with the T clip seated (Fig. 11a). This is relevant for treatment planning, as ridge reduction may be indicated to provide space for the denture.

In the laboratory method, the denture is completed with the female part T integrated into the denture. The dentist then chooses the level of retention required by selecting the appropriate plastic inserts and seating them in part T (Fig. 11b). The plastic inserts are designed to compensate for transfer inaccuracies during the impression, master cast fabrication and post-processing stages. The presence of a laboratory technician is recommended for the chairside technique. A spacer is placed on the tube bar prior to seating the E clip to ensure vertical resilience. The spacer ensures a slight gap between the E clip and the tube bar so that when the patient bites down, the E clip does not overload or distort the bar as the denture beds into the supporting mucosa.

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A small bead of cold-cure acrylic resin was then placed on the E clip, covering the retentive element of the clip. The E clip was then attached to the denture with small increments of resin (Fig. 13a). The resin was allowed to cure fully before the denture with the E clip was removed from the mouth. The remainder of the void was then filled with cold-cure resin and allowed to cure outside the mouth (Figs. 13c & d). Ideally, this process should take place in a pressure pot.

A transfer jig that fits into the E clip and is effectively a tube bar replica can be utilised if a large volume of acrylic has been used to house the E clip. The denture with the transfer jig seated in the E clip is bedded into a patty of fast-set plaster, similar to a denture-repair scenario. Once the stone has set, the denture is placed in a pressure pot with warm water and the self-curing resin is allowed to polymerise. Once the acrylic has fully cured, it is separated from the stone base and the transfer jig and all excess acrylic is trimmed.

At least 50 per cent of the lamellae of the E clip must be clear of resin. Only the superior part of the E clip with the attachment portion and shoulder section is locked into acrylic (Fig. 13c). The lamellae must be free to flex over the tube bar during insertion and removal of the denture. If the resin is in direct contact with the lamellae, the denture may not seat, as the E clip cannot flex. Finally, the definitive prosthesis was seated (Figs. 14a & b).

The level of retention of the E clip was adjusted using the activation and deactivation tools provided in the restorative kit. The occlusion was checked and adjusted after verifying that the denture had been properly seated, using pressure-indicating paste. The bar assembly is required to retain the denture in the two-implant scenario. Support is derived from the conventional hard- and soft-tissue load, bearing areas like the residual ridge and the buccal shelf. The patient was then instructed on appropriate care of the implants and the prosthesis, and a routine recall and maintenance programme was instituted.
Discussion

It is imperative that the block-out procedure around the bar assembly is correct. Otherwise acrylic will enter an undercut area and cure, thus locking the denture to the bar assembly. As a consequence, there would be no option but to cut the denture from the bar to free it. This will not only ruin the denture, but may also damage the bar—a very costly and time-consuming mistake. The E clip is designed for use with the two-implant bar and should be picked up with a self-curing resin as explained. The T clip is for a laboratory-processed denture on four or more implants, as the plastic inserts correct any processing errors. It must not be used in a two-implant situation.

Several studies have shown that conventional bar- and clip-retained overdentures transfer significant stress to the supporting peri-implant tissues (mainly bone). The key to the SFI-Bar system is that the bar is assembled in the patient’s mouth without the use of soldering, laser welding or conventional bonding techniques, thus reducing stress transmission to and bone loss around the implants. Studies have demonstrated that any laboratory-based technique that requires a master cast made from a dental impression will result in a bar that is not truly passive. As a result, several authors have suggested that the only way to achieve a passive fit would be to assemble the framework intra-orally and then bond the bridge pontic in place. This is the method employed with this system.

There is no casting, soldering, laser welding or bonding of components when fabricating the definitive bar. This, combined with the universal ball-joint nature of the components, ensures a true passive fit when the bar is assembled. The finite element analysis clearly shows the stress-free nature of the bar when being assembled and when the prosthesis experiences loading (Figs. 2a–c).

No laboratory time is required to fabricate the bar and there are no costly implant components or gold-alloy charges. Clinically, there is no need for the bar sections to be soldered in an attempt to achieve passive fit—a step that may need repeating—as with the conventional method.

There are no soldered or laser-welded joints, so the bar assembly has no inherent weak points that may fracture or corrode. The bar is assembled by the clinician, who also attaches the E clip intra-orally. The reduced number of clinical appointments, laboratory time and component costs result in reduced treatment costs for the patient. In the case presented, for example, the bar assembly was completed in only six minutes. This is approximately the same time it takes for a polyether impression material (like Impregum) to set!

Conclusion

The SFI-Bar is relatively inexpensive compared with conventional gold castings and CAD/CAM options. The overall cost of the prosthesis and treatment time are significantly reduced compared with conventional and CAD/CAM techniques. Precision-milled components provide an improved quality of fit. The physical and mechanical properties of the component materials can be controlled accurately, which is difficult to achieve with conventional casting methods. The SFI-Bar can be connected to two or more implants to create a full-arch bar if needed, while the SFI-Bar system produces a bar assembly that seats passively as demonstrated by finite element analysis. The passive-fit bar assembly can result in greatly reduced stress transmission to the supporting implants. Studies have demonstrated that this is also a viable treatment option for immediate-loading situations in the mandible, provided that the implants achieved insertion torques exceeding 50 Ncm approximately.

The finite element data and images were kindly provided by Dr Ludger Keilig, Endowed Chair of Oral Technologies, University of Bonn, Germany.

Disclaimer: The SFI-Bar, implant adapters and E clips were provided by Cendres+Métaux. The author did not receive any financial inducements to write this article or payment towards laboratory charges, nor was any other kind of payment given or received.

Contact

Dr Tussavir Tambra
BDS, DDS, MS Prosthodontics (Michigan)
Wolverhampton
United Kingdom

dr.tambra@hotmail.co.uk
CAD/CAM-based restoration of an edentulous maxilla

**Introduction**

There is probably no other treatment method that turns our patients’ quality of life for the better so critically and predictably as the restoration of the edentulous jaw using implant-supported dental replacements (Alfadda et al., 2009). An implant-based, telescopic bridge should be viewed as the treatment of choice for the rehabilitation of an edentulous mandible (Abd El-Dayem et al., 2009). This is the conclusion drawn from the results of an investigation by Eitner and his colleagues in 2008, especially in anatomically difficult situations, in which an implant-supported superstructure guarantees an adequate prosthetic rehabilitation. Visser et al. showed in 2009 that the implant-supported restoration of the edentulous maxilla also represents a proven and effective treatment method with predictable success.

**Connection elements**

Various anchoring elements such as bars, double crowns and a variety of prefabricated connection elements for the replacement of teeth have been discussed in the past (Alfadda et al., 2009; Eitner et al., 2008). A bar connection and telescopic crowns are favored for the edentulous maxilla, since, in contrast to flexible connections, these can prevent the denture...
from tilting. Which of these two connection types is to be preferred, however, seems unclear. Implants supporting telescopic crowns exhibit a reduced sulcus fluid rate, which is interpreted as a sign of a slight inflammation of the periimplant tissues. This, however, as Eitner and his colleagues showed, does not lead to a reduced rate of implant loss in comparison with implant-supported bars, even over a longer period. Bar-retained, implant-supported superstructures, on the other hand, are significantly less prone to repair, with the result that, according to the working party under Eitner, no alternative restoration can be identified as to be preferred. In each case, following extensive treatment, the patient treated expects—for him, from a financial and, above all, an emotional point of view—a substantially uncomplicated, mechanically “maintenance-free” rehabilitation. In this respect, restoration using a bar-retained, removable superstructure resembling a bridge is, for us, the first choice. As a matter of principle, we include two interlocking mechanisms to improve the wearing comfort. This prevents a reduction in the retention of the removable unit caused by abrasion. Furthermore, the interlocking gives the patient the important feeling of confidence, since unwanted loosening of the restoration is precluded.

_Materials_

Individually milled bars are usually cast in a chrome-cobalt or gold alloy. A recent option is the central CAD/CAM fabrication of virtually designed bar constructions in accordance to a model scan. This fabrication variant has numerous advantages: on the one hand, the tension-free fit of the bar on the implants is not affected by the shrinkage of the metal caused by cooling. On the other hand, it is possible to manufacture the bar from titanium, which may result in a reduction in gingival inflammation (Abd El-Dayem et al., 2009), since there is a better attachment of the tissues here. The team under Abd El-Dayem further concludes that both advantages together, the absolutely tension-free fit of the bar and the material itself, could lead to even less peri-implant bone resorption, which further improves the long-term prognosis.

_Case presentation_

A 73-year-old woman, a non-smoker with an unremarkable medical history, was given six implants with two milled bars as anchoring elements. Five XiVE S plus implants were inserted during a simultaneous sinus floor elevation and were allowed to heal submerged over six months. When the implant was uncovered, a vestibular graft was performed with an apical transposition flap. Due to the less favorable bone volume in region 16, an additional XiVE TG plus implant was inserted subsequently for the purposes of the procedure and was immediately loaded (Fig. 1). The impression for the fabrication of the CAD/CAM bars was made four weeks later on the MP abutments inserted during this consultation (Figs. 2 and 3).
case report _ restoration of edentulous maxilla

The advantage of the Friadent MP abutments is the transfer of the working level from the implant shoulder—that is, the crestal edge of the bone—to a supracrestal plane. Hence, the apposition of the marginal tissues on the abutment components is not affected by try-ins and other treatment steps. Furthermore, a simple visual check of the bar seating can be made. Figure 2 shows the patient’s condition prior to impression making, with inserted Friadent MP abutments. The model fabricated using the MP analogs and a XIVE TG implant analog was sent to the DENTSPLY Scan Center with the temporary construction.

The option of displaying and masking various structures, such as the soft tissues, the dental arrangement, the implants and the bar construction, allows a simplified check of the construction proposal (Figs. 4a to 4d). This is adjusted to the practitioner’s preferences as required. Galvanic bar latches are manufactured on the titanium CAD/CAM-fabricated bars, embedded in the openings for the slide axles. The tertiary structure is cast from a chrome-cobalt alloy. In order to guarantee a tension-free fit for the supported metal base, this was cemented to the bar latches in the patient’s mouth. The Genios dentition (DENTSPLY DeTrey) was transferred to the manufactured framework (Figs. 5 to 8).

The final restoration was adjusted to the patient’s mouth and inserted (Figs. 9 and 10). The dentition showed excellent translucency. On follow-ups 27 months after the implant insertion and 21 months after the incorporation, the tissue conditions were stable (Fig. 11). The crestal bone level was still located on the implant shoulder. No resorption was observed.

Conclusion

Because of its good primary stability, even in marginal situations, the XIVE implant system is applicable in an augmentation of the maxillary sinus with simultaneous implant placement. Where there is little remaining bone volume, the prerequisite for this is a classic, submerged healing phase without pressure. The option of relocating the connection level to an epigingival level following uncovering reduces the risk of a deterioration of the bone in the region of the implant shoulder due to manipulation. CAD/CAM fabrication of the bar constructions markedly improves the fit of these constructions, which a practitioner who has used this new technique will immediately recognize. Together with the use of titanium as the component material, the tension reduction represents a further advance in the reproducible retention of marginal bone. Furthermore, the bar construction with latches restores the desired level of security and hence vitality to the patient.

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

about the author

Dr Arnd Lohmann

Dr Arnd Lohmann got his Licensure in Hamburg, Germany, in 2002 and worked as assistant doctor in Oral and Maxillofacial Surgery from 2002 to 2003. In 2003 he completed his dissertation. He has focused on Oral Implantology since 2003 and completed his Master of Science in Oral Implantology in 2007. He is a member of the German Society of Oral Implantology (Deutsche Gesellschaft fuer Orale Implantologie, DGII), the German Association of Dental Implantology (Deutsche Gesellschaft fuer Zahnarztliche Implantologie, DGII) and the German Association of Oral Implantology (Deutsche Gesellschaft fuer Implantologie, DGI). He works in a partnership and medical practice with Dr Rainer Lohmann in Bremen, Germany.

Dr Arnd Lohmann, MSc

Ostpreussische Str. 9
28211 Bremen
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Tel.: +49 421 443868

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Introduction

A high clinical evidence of grafting procedures from extraoral autogenous donor sites like i.e. from the iliac crest in difficult bone loss sites is still the practice in oral or oral-maxillofacial surgery. However, the invasive surgery combined with a prevalence of patients morbidity and suffer is an issue to discuss the persisting legitimation of this procedure. Since the appearance of reliable bone substitute materials with or without any autogenous bone added, the positive results concerning longterm stability of regenerated bone even in difficult cases have become very predictable.

This article will point out in a case report the reliability of alternative and less invasive techniques for 3-D bone reconstruction in the mandible and question the necessity of iliac hip grafts for intraoral bone augmentation.

Materials and methods

A female patient aged 48 years old with a severe and advanced periodontitis in the maxilla and the mandible came into our clinic with the desire of a complex treatment plan with an implant retained denture in both jaws. This case report will pinpoint the treatment of the mandible. A CBVT was revealing massive bone loss in height and width in the mandible arch from canine to canine and apical cyst at tooth 23, 26 and 28 (Figs.1 & 2). According to our protocol we started with an initial scaling and HELBO®-Laser decontamination prior to the surgery to decrease the number of pathologic germs and post op infections. Tooth 18 and 19 in the left mandible were intended to maintain until the finalization of the prosthetics to give some comfort during temporization with an immediate denture that was placed post op. Preoperative the patient received 1,200 mg of Clindamycin. The patient desired the surgery of tooth removal and ridge augmentation pursued under general sedation.

After nasal intubation and local anesthesia the bridge in the lower was removed and the remaining teeth despite from 18 and 19 as mentioned before (Figs. 3 & 4). After full flap preparation with crestal incision, releasing incisions and exposure of the mental nerve exit, the volume of the severe bone loss was revealed as well as the minor soft tissue conditions due to inflammatory tissue proliferation (Figs. 5 & 6). The success of 3-D bone augmentation is bonded to primary wound closure and tensionless flap adaptation. Thus, the periosteum is dissected with a scissor from the episiotal connective tissue before augmentation procedures to reduce bleeding and guarantee a
The flap flexibility without compromising soft tissue and nutritive blood vessels.

For bone augmentation a bone block was harvested via ultrasonic surgery from the retromolar region distal from 32 of the right mandible (Piezotome II, Acteon France).

This bone block was divided into two halves. One was used for two "bone shields" to create a mold for the grafting material, one was particulated with a bone mill and mixed with defect blood and a β-TCP (Nanobone®, Artoss GmbH, Rostock, Germany). The bone blocks were fixed with two osteosynthesis screws (Fig. 7) and the mixture of autologous bone plus β-TCP in mixing ratio 50:50 was used to fill the gaps and increase the ridge width and height. To increase the bone augmentation material volume an allograft block (Puros®, Zimmer Dental) was particulated and added to the mixture. Before placing the material a non resorbable titanium-reinforced membrane (Cytoplast Ti-250, Sybron Implant Solutions) was adapted lingually and folded to shape the augmentation complex according to the new and desired crest volume (Fig. 8).

Upon the non resorbable membranes three xenogenous resorbable membranes (Tutodent®, Zimmer Dental) were placed according to the sandwich membrane layer technique to create a better adaptivity to the flaps (Fig. 9) and enhance wound healing. Primary wound closure (Fig. 10) was achieved with a 4-0 metric suture (Gore-Tex®, Gore). The patient carried a clamb retained provisional denture that was rebased with a soft
material and was instructed to have no solid food for 10 days. Postoperative the patient continued with 1,800 mg Clindamycin, Ibuprofen 600 mg and a decongestant enzyme based medicine (Bromelain-Pos®, Ursapharm, Germany). The next day the patient had an expected cheek swelling but was not suffering from pain, after 10 days the sutures were removed. However, 6 weeks later a membrane exposure of the non resorbable membrane was evident, but due to the fact that this is tolerable when the patient is instructed to maintain oral hygiene and re-called once a week, the success of the outcome was not threatened (Fig. 11a). The titanium pins and the titanium reinforced membranes were removed after 4 months.

Eight months after augmentation the 2-D aspect of the CBVT showed clear evidence for entire ridge reconstruction of the deficient sites (Fig. 11b) with osteosynthesis screws in position. To emphasize the efficiency and predictability of this technique the pre-op scan of region 28 (Fig. 12a) and the reconstructed bone 8 months later (Fig. 12b) show clear an increase in bone height and width.

The well vascularized bone was used to insert 4 dental implants (4 × 3.75 × 13 BEGO Semados®, BEGO, Germany) for a later bar-retained denture, the healing time is estimated with 8 weeks (Fig. 13) and was not completed before publication, here my apologies to that.

_Discussion_

3-D bone augmentation in cases with severe bone loss can be accomplished also with a less invasive surgical protocol than the iliac hip graft. The morbidity can be dramatically reduced with the use of ultrasonic devices. Regarding the donor site, which may be favorized with the retromolar region patients have close to zero complains if a single incision procedure is performed. Allograft materials may enlarge the volume of the augmentation material and in addition to that the success of β-TCP is not to be questioned.

Regarding the long term stability the regenerated bone is superior to pure autologous bone from the iliac crest, which resorption rate is much higher compared to intraoral bone or β-TCP. Reduced pain and postoperative complains should be reduced and enlarges the number of patients willing to undergo oral augmentative procedures.

_Contact_

Prof Marcel A. Wainwright
DDS, PhD
Dentalspecialists
Kaiserswerther Markt 25–27
40474 Duesseldorf, Germany
Weinrecht@aol.com
www.dentalspecialists.de

Universidad de Sevilla
Facultad de Odontología
Calle Avicena s/n
41009 Sevilla

**Fig. 11a** Membrane exposure of the non resorbable ePTFE membrane after 4 weeks. Clearly visible is the enhanced soft tissue situation.

**Fig. 11b** 6 months post surgical the fully reconstructed bone situation is obvious.

**Fig. 12a** CBS of the pre-op region 44 with entire loss of the buccal plate in region tooth 44.

**Fig. 12b** Region tooth 44 after 6 months of healing with fully reconstructed bone prior to implant surgery.

**Fig. 13** Inserted implants in the fully reconstructed bone.
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Single-tooth implants in the aesthetic zone—Challenge and opportunity

Author: Dr Ata Anil, Turkey

Single-tooth implants in the anterior region permit not only functional reconstruction at the highest level, but also reconstruction for aesthetic reasons. However, when providing cosmetically attractive treatment, a large number of parameters need to be taken into account, and experience and knowledge of physiological processes are essential. The following article will describe the implant-supported reconstruction of an anterior tooth lost as the result of an accident.

After extraction of the fractured root, we performed a reconstruction of the soft tissue to act as a basis for a harmonious reconstruction of red–white aesthetics. This was performed at the same time as implant placement via bone augmentation and connective tissue transplant. The surgical measures applied allowed optimisation of the hard and soft tissue and, using a gingiva former, the shape of the gingiva could be adapted to the neighbouring teeth. Delivery of a ceramic...
crown completed the attractive final cosmetic result.

In the case of completely or partially toothless arches, implant-aided and -supported rehabilitation is a successful method of treatment in which single-tooth implants are largely used to restore function and aesthetics. Anatomically correct positioning of the implant can, however, only be realised, if the necessary bone level and soft tissue profile are considered in the planning and treatment. Tooth shape and colour are equally important for providing an aesthetically harmonious appearance. The anterior region of the maxilla is not referred to as the aesthetic zone without reason. After all, it is the most striking region of the stomatognathic system and affects facial appearance.

This is why special rules apply to implant-supported single-tooth restoration in this region with regard to the choice of abutment: titanium abutments may show through translucent ceramics, lead to dark colour effects or have a negative impact on the optical effect of the papillae. In the course of time, the edge of the abutment may even become visible owing to changes in gingival profile. A number of established surgical procedures can be employed to improve conditions for a natural appearance of the restoration, but the healing of the soft tissue plays a major role in ensuring long-term success of these measures. Ideally, primary wound healing remains the objective. Any loss of bone after tooth loss is to be compensated for with suitable augmentation techniques.

Case report

A 50-year-old female patient with a non-contributory medical history presented to our dental practice with complaints about tooth 21, which had been fractured in a traffic accident (Fig. 1). The X-ray showed no apical lucency in the area of the destroyed tooth (Fig. 2). Clinical examination showed a sufficient volume of attached gingiva and that the frenulum was in a physiological position. However, the vestibular soft tissue was ruptured in the area of the fractured tooth. It seemed as if the bone underneath the rupture had also been involved.

Although most of the mesial and distal papillae were in their correct position and still connected to the root cement of the neighbouring teeth, the distal papillae had receded by approxi-
industrial report _ single-tooth implants

Fig. 9. The X-ray after six months demonstrates good bone regeneration.

Fig. 10. The clinical situation after removing interim treatment.

mately 1 to 1.5 mm. As the length of the remaining root was insufficient for a combined endodontic-prosthetic restoration and the crown margin was to be positioned sub-gingivally to provide an optimal aesthetic result, we decided to extract the remaining part of the root and to replace it with a XiVE S plus implant (DENTSPLY Friadent).

The periodontal fibres in the root area were loosened with a scalpel. The periodontal gap was extended with a periotome and the subcrestal fibres separated. This was the most atraumatic course of tooth extraction. Then, the extraction alveolar was carefully debrided to remove any remaining granulation tissue completely. To avoid damaging the labial bone lamella, no force was exerted in bucco-palatal direction during root extraction. The soft tissue remained undamaged by avoiding a vertical incision.

Using palatal mucosa as a free gingival graft, we ensured primary healing in the region of the extraction alveolar. This was previously measured with a periodontal probe, the corresponding trimmed graft placed over the alveolar cavity and stabilised with sutures (Fig. 3). To support the mesial and distal papillae and to condition the tissue, a temporary crown was constructed from composite material and fixed to the neighbouring teeth as an ovate pontic (Fig. 4). Implant placement was carried out six weeks later. Immediate implant placement after tooth extraction is usual, but in this case controlled bone regeneration was also required, which made implant placement directly after extraction of the remaining root part inadvisable.

A para-crestal incision some 2 to 3 mm palatal to the alveolar ridge was carried out under local anaesthetic, and a mucoperiosteal flap was prepared using a periosteal elevator. The flap reached buccally to the muco-gingival junction. This way, the alveolar ridge could be exposed. The bone was cleared of connective tissue. The implant position was determined using a locator. In order to avoid perforation of the labial bone safely, the implant was not to be inserted directly into the alveolar socket but shifted slightly in a palatal direction.

To permit insertion of the implant within the aesthetic window, we determined the ideal bucco-palatal alignment using surgical suture materials fixed to the neighbouring teeth (Fig. 5).
This allows for adequate dimensioning of the crown on the one hand, and provides sufficient labial tissue volume on the other.

The implant site was prepared for a XIVE S plus (3.8 mm in diameter, 15 mm in length) implant. By involving the palatal cortical bone and bone-specific preparation afforded by XIVE and the condensing thread of the implant, we achieved a torque of 50 Ncm during insertion. After placing the XIVE implant in its final position, an approximately 2 mm wide gap remained to the Lamina vestibularis (Fig. 6). We mixed the drill cuttings collected with a bone trap, which is standard procedure, with a xenogeneic bone grafting material and filled the defect.

As a means of protection, we covered it with a correspondingly trimmed absorbable membrane. This was covered with a gingival graft from the palatal mucosa, and the flap was repositioned and sutured ( absorbable sutures 4.0; Figs. 7 & 8). As during the first intervention, Amoxicillin (Augmentin 1,000 mg) was given as antibiotic cover and chlorhexidine mouthwash solution and naproxen sodium (Apranax 275 mg) to be taken as required. Healing progressed without problems.

Six months later and following successful osseointegration, uncovering was done using a scalpel (Figs. 9–11). The TempBase (DENTSPLY Friadent), which was used as placement head and replaced with a cover screw after insertion, was re-inserted and temporarily restored with an appropriate chairside-modified TempBase Cap (Fig. 12). The transition between the plastic cap and the previously prepared temporary crown was filled with composite material.

During placement of the temporary crown, pressure was exerted on the underlying soft tissue and the papillae until the region became ischemic (Fig. 13). This condition needs to be reversible, and it is essential to check that the tissue regains its red colouring after a few minutes. In our experience, this method achieves proliferation of the papillae coronally. After four weeks, the temporary crown was removed and replaced with a transfer coping and the impression was made using a type I polyvinylsiloxane.

The resulting ceramic crown manufactured in the laboratory was bonded to the matching CERCON abutment (DENTSPLY Friadent) using a light-cure adhesive after try-in (Fig. 14). After
three years, conditions remained stable with a pleasing aesthetic appearance (Figs. 15 & 16).

Discussion

Implants for single-tooth replacement are an important and established treatment concept. For this case, an implant was placed soon after extraction of the traumatised tooth because this appeared to be the most appropriate protocol, also with regard to the good condition of the remaining teeth. A number of investigations have found ridge atrophy during the first year of tooth loss. As a rule, atrophy commences after the third week and the Crista alveolaris decreases by 30 to 50% within a year.

To protect the bone against increasing degeneration through physiological load, the implant should ideally be placed directly after tooth extraction (immediate implant placement) or after four to six weeks at the latest (delayed immediate implant placement), once soft tissue healing is complete. If the gingiva and bone are not involved, the implant can be placed immediately.

In cases in which the tooth has been lost for endodontic reasons (owing to periodontal disease or following trauma with bone and gingiva loss), augmentative procedures are usually also required. To ensure secure healing of the membranes and soft tissue grafts used for augmentation, the surgical area should be covered completely to allow primary healing. Ideally, the soft tissue is given four to six weeks to regenerate before placing the implant. Primary wound healing can be ensured by placing a free gingival graft over the extraction wound.

To provide long-term success of the implant, the endosseous part of the implant must be covered completely by bone. Here, the vestibular regions of the implants play a major role. After bone reconstruction, it is also important to cover the entire region with soft tissue. The combination of bone reconstruction and grafting with autogenous bone, which can be collected using a bone trap for example, has proven a highly practicable method for augmentation. By covering with an absorbable collagen membrane, the soft tissue is isolated from the regenerative region. In this case, as the vestibular soft tissue was of insufficient volume despite the free gingival graft, a palatal connective tissue graft was placed in addition to the augmented region. The thickness of the soft tissue affects the degree of recession. As a thick gingiva is better nourished, a connective tissue graft is often used in aesthetic regions.

In the case of single-tooth restorations, the localisation of the implant is the most important factor for achieving aesthetically pleasing reconstruction. Templates should be used for positioning. If this is not possible, the manual methods in use for years can be employed. The length of the papillae, measured with a periodontal probe, bone thickness and the vestibular lamellae are very important for long-term stable treatment. In our case, we used the Iglhaut locator because the implant was not placed directly into the alveolar socket but into a more palatal-oriented position.

We know from the literature that soft tissue is a mirror of the bone. Using a palatal connective tissue graft, a thin gingival biotype can be converted into a thick biotype. In our case, we employed an envelope technique for transplantation of the sufficiently dimensioned palatal-source mucosa graft. If the soft tissue is thick enough, it is possible to shape gingiva and papillae with temporary crowns. In addition, if there is sufficient distance to the bone, the papillae can even be extended. Pressure is exerted on the papillae to profile them in the direction of the crown. Sufficient connective tissue thickness prevents the showing through of titanium, but a darker discoloration is definitely avoided by using zirconium dioxide abutments.

Summary

Additional bone and soft tissue constructions are usually necessary to provide a long-term appealing reconstruction with single implants in the aesthetic zone, and localisation of the implant must be planned accurately. The implant should be placed as soon as possible after tooth loss. Zirconium dioxide is a proven material for abutments.

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The filter principle: Is every patient a finals patient?

Author: Simon Hocken, UK

"Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work. And the only way to do great work is to love what you do. If you haven’t found it yet, keep looking. Don’t settle.

As with all matters of the heart, you’ll know when you find it. And, like any great relationship, it just gets better and better as the years roll on. So keep looking until you find it. Don’t settle.”

Steve Jobs, CEO of Apple Inc. in 2005

“...You remember finals, don’t you? Of course you do. Your examiners carefully selected a patient(s) for you to examine and diagnose and for whom to present a treatment plan. The finals patients were unlucky enough to have more than one dental problem and you were marked on finding all of them and your ability to determine a set of solutions for the patient.

Afterwards, most of us headed off into practice, where a series of finals patients are paraded in front of us on a daily basis. Now these patients willingly pay us to make our professional judgements, offer our best solutions and suggest a fee for doing the dentistry.

However, that’s not always what happens, is it?

There’s something that happens in general dental practice (be it public like the National Health Service [NHS] here in the UK, mixed or private practice) that is rarely spoken about in dental magazines, online forums or even at the bar at dental conferences. And it’s this: many dentists consult with, examine, diagnose and treatment plan their patients, not in the way that they did for their finals patient, but by applying some sort of filter—a filter of which the patients are completely unaware. Such filters have several elements and in my 25 years of being a dentist, followed by ten years of coaching dentists, I think I’ve probably heard or seen them all, or at least their effects.

The filter may have some or all of these components:

1. Will the patient like me if I tell him about all of this?
2. Will the patient come back if I tell him about all of this?
3. Will the patient think I am overprescribing?
4. (For returning patients) If I tell the patient about all of this now, will he wonder why on earth I haven’t mentioned it before?
5. Will the patient be willing to pay for all of this?
6. If I persuade the patient to have the big treatment plan, what happens if it goes wrong?
7. As long as I make a note on the records, I am keeping myself within the legal rules.

The enemy within here is fear, and not the patient's but the clinician's. And so the filter is applied and the patient is offered the treatment plan that the clinician believes is absolutely necessary or the one he feels the patient needs. Presumably, he leaves the rest until such treatment becomes (as he deems it) necessary or needed. An additional filter, of course, is the one that pushes the dentist towards offering treatments that are well paid or earn the most number of units of dental activity.

Let me run this analogy past you.

Imagine taking your three-year-old, £25,000 car in for a 30,000-mile service. During the course of this, the technician discovers that as well as the regular service items needed, your car also has two sets of worn brake pads. In addition, the front brake discs are warped, the rear dampers are leaking and two tyres are nearly at their worn-tread marks.

As a customer, which of these phone calls would you like the garage to make?

1. The call that lists the faults, your options and the costs for having everything put right?
2. The call that tells you about the faults they think you will want to hear?
3. The call that tells you about the faults that you will be able to see?
4. The call that tells you about the faults they think you will be willing to have fixed?
5. The call that tells you about the faults that will earn them the biggest margin?

And what will the garage do about the faults they don’t tell you about? Perhaps, put a ‘watch’ on their records and consider telling you at the next service?

_Duty of care_

I know that some of you will be wincing already at my comparison between a clinician and a mechanic but there's more mileage in this analogy still to come. After paying for just the service, you drive off from the garage with the faults left unreported. A child runs out in front of your car and you fail to stop in time because of the worn tyres/brake pads/discs/dampers. In the investigation that follows, these things come to light and spark a witch-hunt.

A good garage owner dare not risk this and the inevitable damage to the garage’s reputation. He takes his duty of care seriously and must tell you exactly what the garage has found wrong with your car. So what’s really going wrong when a patient leaves a dental surgery with half a treatment plan?

In my opinion, this happens because we’ve lost the simple, straightforward, trusting relationship between patient and clinician that we had as a final-year student. External circumstances such as insurance companies, the economy, the practice finances and, probably most importantly, our lack of confidence and self-esteem have filtered our behaviour so that we agree to compromise our professional skill set and integrity in order to be liked, keep the patient or stay within our comfort zone.

“We agree to compromise our professional skill set and integrity in order to be liked.”

So, how does that sound? Not so great from where I’m sitting and let’s not tell the national newspapers. When I left the NHS in 1992, I decided to get rid of all the filters I had acquired, and simply show and tell my patients what I could do for them as if they were one of my family and money and time weren’t an issue. I’ve used exactly the same approach in my coaching practice. I was lucky enough to be mentored by some great coaches on the idea that you often do your best coaching just before you get fired (for telling it like it is). And that’s what I do for our clients.

In my view, you have to decide what sort of dentist you want to be: either an anxious single-unit, one-tooth-at-a-time dentist, forever destined to gross a thousand pounds a day, whilst complaining that patients don’t want your treatment; or a dentist who communicates clearly and straightforwardly with your patients about what you can see in their mouths and the best way to fix it, thereby giving them back their responsibility for their health and leaving the decision about whether to proceed with them._

_about the author_

Simon Hocken is Director of Coaching at Breathe Business, a business-coaching consultancy based in Kingsbridge in the UK. He can be contacted at info@nowbreathe.co.uk.
Collaborating and connecting in the dental space

Author: Shane Hebel, Canada

Communication skills are an integral part of our daily lives. How we communicate defines who our friends are, what our families think of us, and how our businesses are perceived by the community at large. Typically, when you think about communicating, you think about it in relation to your friends and family. We spend countless hours thinking about how we speak to other people, what effect it has on them, whether we should have said something or not, or if other people think we’re upset with them or frustrated based on our words and actions.

Oh wait!

Actions. That’s another part of communicating that many people don’t think about. How your body moves in rhythm with the way you’re talking can have a major effect on what people perceive you to be saying. Our bodies and mouths move in a dynamic that we don’t yet really understand, but our subconscious selves do. Have you ever gotten that feeling that even though someone was apologising to you, they didn’t really mean it? Or that someone was really upset when they told you that everything was fine? Why do you think that you get those feelings? Something about the way that that person is communicating with you—other than with their words—is telling you that.

When bad goes good

In 1995, Tylenol had a problem. Many bottles of its medication had been tampered with and would prove to be dangerous or fatal if ingested. Right away, the company recalled its entire product and...
spent a huge amount of time and money figuring out what went wrong and in making sure that no one became ill—all at the expense of its brand image. The company did the right thing and stood by its values. Here’s the kicker—while it thought that posting this recall would destroy its company image, it actually bolstered it. People found it extremely admirable that the company was more than willing to tarnish its own reputation and spend huge amounts of money to stand by its values. They stood by Tylenol. Tylenol had communicated to people that it was an ethical company and that communication was heard loud and clear.

Some people and companies don’t care what other people think of them. In fact, some actually thrive on their inability to communicate and the dislike people feel for them as a result. Take Paris Hilton, Lindsay Lohan or Kim Kardashian. These three women are all celebrities who communicate a terrible image and are famous for it. They succeed because people don’t like them and are just itching to figure out what they’re going to do next.

**Communicating**

However, a terrible image is not what most people (and especially companies) want. People naturally want other people to like them. They want to be seen as people who stand by their values, can get their point across, and can do so without projecting the image of being mean, frustrated or impatient. As something that many people strive to do, communicating effectively has been discussed extensively in our society. Countless seminars and training programmes have been conducted that deal with communicating with people. Even more books have been written on the subject.

So why is how we communicate so important? Good question. Communication is important because it gives others an idea of what we think, who we are, and what we stand for. This is extremely important in your personal life. It’s even more important in your professional life. How others perceive you can have a huge impact on how smoothly your office runs, how many new patients you get, and how easy doing business with other people is. Communicating is at the crux of how we function as a society and your ability to function well from a communication standpoint will have huge impacts on your personal and professional life.

One thing that has already been mentioned is how solid communication leads to a smoother internal business process, bringing in more patients (or retaining returning patients), and working together more efficiently with others in the dental space.

**How?**

Let me break each of those aspects down for you to show how increased communication skills can help you in each of those areas.

The first major area that is going to affect how you communicate is your internal business processes. How you communicate internally within your office can have a huge impact on how smooth your operations are, how happy your staff are, or even what your monthly expenses are. All of these things can be improved by communicating more efficiently and effectively within your organisation. Huge mistakes can be made in business through a failure to communicate or a lack of understanding among team members. Take Morgan Stanley as an example. Recently, they made a US$2 billion blunder that has led to increased surveillance of all US banks by the government, an investigation into the company, a huge drop in their stock price, and the resignation of some of the top performers and managers at the company. Why was this mistake made? Someone messed up because of a lack of communication.
Think about how you communicate with others within the office on a daily basis. The key is to recognise that not all communication is verbal. Reflect on how information is processed, received, transferred, and stored within your company. Then reflect on whether those processes are effective and if everything is being communicated the way it should be. With patients, think about how you and your staff come across. Do patients generally have a good sense of what they’re getting into when they come to your office? Are they aware of after-care procedures and processes? Do they ever seem confused? Ask yourself these questions and consider asking patients how they feel about your office. If you’re not communicating what you’d like to with your patients, there are definitely things you could tweak in order to be more effective on that front.

There is a well-known theory in the business-marketing world regarding how information is communicated in a business context. Let’s say you have a certain concept you want to communicate to someone. You communicate it to them. They hear a certain concept and act upon it. Those are the three main parts of the communication of a message. The interesting thing is that the message that you intended to communicate is not always the same message that is received. How closely these two align is determined by the medium and mode of communication that you use. Information can be communicated in a variety of ways within the office. Let me review some of the more common ones briefly.

**In person**

Offices are fast-paced environments and, frankly, written communication is slow. One of the most common forms of communication in the office environment is oral communication. Speaking with your reception staff, hygienist, or assistant is usually the fastest way to get information across. However, there is one problem with relying on oral communication alone: it’s notoriously unreliable. People mumble, mishear things, tune out, don’t write things down, and forget. Oral communication can thus lead to misunderstandings more so than any other form of communication. Another concern is that oral communication isn’t recorded. Unless someone writes down what is said, there is no record of it. This can play havoc in internal work relationships and can lead to an ineffective process in some cases. Of course, there are times when oral communication works better than anything else (for example, in the operatory), but there are a number of cases in which oral communication should be converted to something more permanent or at least written down. An example would be asking your reception staff to refer a patient to a specialist. If the request is made orally, staff may forget, the doctor may think that he’s made the request when he hasn’t, and the request could fall through the cracks of the endless stream of office paperwork.

An alternative may be to use e-mail or have a written note taken on the spot. This is just one example of how communication in your office could be made more efficient. It also leads us to the next type of office communication.

**Written communication**

Written communication can take on many different forms. Paper notes, e-mails, faxes, various feedback and consent forms, and even Post-it notes are all examples of written communication that you may see in your office space. Unlike oral communication, written communication is more permanent and provides a record of what was communicated throughout the office, making it a desirable communication form. The only problem with it is that it’s slow and can easily be misinterpreted. Messy handwriting, short-forms, and absence of tone and body language can all lead to a written note being misinterpreted. However, this happens far less often than with oral communication because there is a paper trail. People can ask for clarification, check things that happened previously, and gain a better sense of what the note is about from supporting documents, other staff or other notes. This is the form of com-
Practice management

Communication desired for most official communication. Staff records, patient records, to-do lists, etc. are typically all in a written format because they can then be tracked. So what do you want to keep in this type of format? You want to write down anything that you want to be able to refer back to at a later date. A not-so-typical form that you may want to consider using is writing down what occurred in meetings with office staff. This will allow you to look back at what was discussed, what items are outstanding, and what you should expect at an upcoming meeting. None of our memories is perfect and writing things down is a huge help in keeping records and helping your practice to run more smoothly.

Body language

The third type of communication (and possibly the most important) is what your body language/appearance and that of your staff says. While not explicit, what your body says can have a huge effect on how people perceive you, what people think of what you say, and even whether people believe what you’re saying to them. There isn't much to be said about body language other than to be aware of how you’re coming across to others and whether there is anything that you’re doing that you could change that would make you appear more genuine, approachable, honest, or any other quality that you wish to demonstrate. In terms of appearance, do you seem approachable and trustworthy? Do you present yourself in a professional manner? Do other people think that you come across as someone to respect? These are all questions that you can ask yourself that deal with your body language and how you present yourself to other people. This matters in all of the interactions that you make—with your staff, clients and partners.

Collaborating

Now that you're aware of the different types of methods of communicating, there is one more area in which they can be applied that can result in huge changes in your business: collaboration with others. When most people think of collaborating and working together, they think internally. Most will think about working together with their family or with their office staff. Very few think about how they can collaborate with others outside of their immediate circle. Yet, this type of collaboration can have a huge impact on your business. Throughout business history, companies have collaborated in order to come up with big ideas and profitable ventures. Think about Sirius Radio; that’s a company that knows collaboration. It only really took off after collaborating with car companies and having the system installed into cars before they left the sales floor. By working together, participating car companies got a new gadget to use to entice buyers to purchase their vehicles and Sirius Radio got access to a brand new market that proved to be extremely profitable.

Collaborating and communicating go hand in hand. If you’re lacking in how you communicate with others, your ability to collaborate with others will also be lacking. Collaboration is all about working together with others to generate returns that are greater than what either party could produce on its own. There are many collaboration opportunities for your practice. One of the most common examples is collaborating with other dentists using circular referral systems. This can result in huge returns for your practice, simply because you were able to collaborate with someone else. Think of other ways you could collaborate in your industry. How can you work with someone and mutually help each other in a way that neither could do on their own? Most of the biggest innovations in the world arose from some form of collaboration, so this is definitely something that you want to think about.

Conclusion

Always be aware of how you’re communicating with other people and always be looking for opportunities to collaborate. Simply being aware can do wonders, as you can change things that aren’t working, enhance things that are, and generally make your practice more efficient both internally and in the image that is presented to the outside world. Decide what you want to communicate as your brand and start doing it!

About the author

Shane Hebel is currently a student studying Finance and Accounting at the Schulich School of Business. He is a sales and marketing executive for My Dental Hub. He is involved in a number of organisations that promote collaboration, connectivity and education, including Impact Entrepreneurship Group, Standard International and, of course, My Dental Buddies.

shane@mydentalhub.com
www.about.me/shane.hebel
www.linkedin.com/in/shanehebel
www.twitter.com/shane_hebel
CAD/CAM systems market in Japan to gain momentum

Manufacturers of dental CAD/CAM systems will have to look towards the Far East, as growth in this industry segment in countries like Japan is expected to outpace traditional markets in Europe and North America, a new report by the Millennium Research Group suggests.

According to the paper released by the Canadian market intelligence provider on Thursday, CAD/CAM markets in Europe will not show improvement before 2014, while Japan will see dramatic growth owing to under-penetration in dental offices and increasing interest by dentists in investing in the technology.

In addition, decreased reimbursement for conventional metal restorations by national health insurance will increase the competitiveness of new materials for manufacturing prosthetics, the report states.

Despite its recent economic troubles, Japan is currently the largest market for dental CAD/CAM and prosthetics in the Asia Pacific region after Australia and South Korea. Since the country has to import much of its CAD/CAM technology from abroad, the field is largely dominated by European and US manufacturers, such as Sirona Dental Systems, Nobel Biocare or 3M Espe. A few domestic companies have launched their own systems in recent years, such as Kuraray Noritake Dental’s KATANA system, which is now distributed worldwide.

Millennium Research Group predicts that the global market for dental CAD/CAM will exceed US$40 million by 2016, to constitute over one tenth of the overall market for dental equipment. With over 60 per cent, chairside systems like intraoral scanners will most likely have the largest share in this segment, the company said.
Bausch PROGRESS 100 and Arti-Fol 12 µ metallic shimstock

Bausch PROGRESS 100 is a smooth fibre-reinforced paper with high colouring capacity that adapts perfectly to occlusal surfaces. The occlusal contact points or centric contacts are marked very precisely because of the paper’s progressive colour transfer.

This 100 µ paper is impregnated with hydrophilic waxes, pharmaceutical oils and the Transculase bonding agent. This unique combination enhances detection of high spots on surfaces that are difficult to measure, such as highly polished metals or ceramics. In addition, its hydrophilic properties make it advantageous for use on moist occlusal surfaces—a highly desirable attribute.

Arti-Fol 12 µ metallic is a high-tech test film with distinctly improved features. It is made of metallic polyester film (shimstock film) of only 12 µ in thickness. This film possesses excellent colour transfer. High spots can easily be detected, especially on ceramic or highly polished metal surfaces. Arti-Fol has a high tensile strength and is ideal for checking approximal contact points when fitting dental bridges and crowns.

In contrast to the conventional shimstock film, Arti-Fol marks high spots precisely. Since the back of the film is metallic, it is obvious which side is colour coated and which is not.

The combination of Bausch PROGRESS 100 and Arti-Fol 12 µ offers considerable advantages, especially for measuring occlusal surfaces such as highly polished metal surfaces or highly glazed ceramics that are difficult to examine. Bausch PROGRESS 100 is used first, transferring the pigments and a thin coat of Transculase bonding agent to the occlusal surface. Contacts are immediately evident.

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The combination of Bausch PROGRESS 100 and Arti-Fol 12 µ offers considerable advantages, especially for measuring occlusal surfaces such as highly polished metal surfaces or highly glazed ceramics that are difficult to examine. Bausch PROGRESS 100 is used first, transferring the pigments and a thin coat of Transculase bonding agent to the occlusal surface. Contacts are immediately evident.

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Dr Jean Bausch GmbH & Co. KG
Oskar-Schindler-Str. 4
50769 Cologne
Germany
info@bauschdental.de
www.bauschdental.com
3Shape’s Dental System offers CAD Design of DENTSPLY Friadent customised abutments

3Shape, a global leader in 3-D scanners and CAD/CAM software solutions announces the official release of new capabilities in its Dental System, allowing the design of two-piece customised abutments using DENTSPLY Friadent pre-manufactured titanium bases.

3Shape has incorporated a complete and original DENTSPLY Friadent library into its Dental System software, supporting DENTSPLY Friadent’s ANKYLOS and XIVE implant systems.

The new library enables dental technicians to use 3Shape’s Abutment Designer to model two-piece abutments using a pre-manufactured titanium base with a customised zirconia abutment top. In order to manufacture the designed restoration, the original titanium base must be obtained from DENTSPLY Friadent and the customised zirconia part can be milled locally by the lab or milling centre.

"DENTSPLY Friadent is a leading implant manufacturer, and many labs are steadfast users of both the 3Shape CAD/CAM Dental System and DENTSPLY Friadent’s abutments," according to Rune Fisker, Vice-President of Product Strategy at 3Shape. "Now they can design virtually and provide highly aesthetic two-piece customised abutments, thereby introducing better choices for dentists and their patients."

"Optimal clinical results and long-term stability can be achieved best by using original components like implant, titanium base and implant library throughout the workflow," recommended Frank Beckerle, Digital Dentistry Global Brand Manager at DENTSPLY Friadent. "To determine the correct position of ANKYLOS and XIVE we also provide the matching scan bodies."

"The DENTSPLY Friadent library gives me even more options in solving implant cases with individual zirconia abutments on titanium bases," stated Björn Roland, Dental Design Schnellbächler & Roland. "Using these libraries with the 3Shape CAD Design software, I can achieve optimal aesthetic results easily and quickly in a few clicks."

The DENTSPLY Friadent library was released on 3 July 2012. Users who wish to benefit from this opportunity should contact their 3Shape distributor for more information on how to obtain the library. The original implant and titanium base must be obtained from the DENTSPLY Friadent distributor, and scan bodies can be ordered from international customer service on +49 6181 595694 or at customerservice.degudent-de@dentsply.com.
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Planmeca introduces Planmeca iRomexis, an advanced mobile image-viewing application for Apple iPhone and iPad devices. This application offers comprehensive features for 2-D and 3-D image viewing and is designed to allow users of Planmeca X-ray units to realise the full extent of their investment. The Planmeca iRomexis application allows users to access images from anywhere in the world using Wi-Fi or 3G networks.

Planmeca is the first to introduce a free native Apple iPhone and iPad application with an integrated 2-D and 3-D image viewer with true 3-D surface model rendering and the capability to access images over 3G networks. All images acquired with Planmeca X-ray units, including Planmeca ProMax 3D volumes and ProFace 3-D facial scans, can be viewed, enhanced and studied.

In addition, the operating status of a clinic’s Planmeca Sovereign and Compact i dental units can be monitored in real time. Images from Planmeca Romexis software can easily be sent through a Planmeca Online account to Planmeca iRomexis device users anywhere in the world. The account holder will be notified automatically on his or her Apple device when new images are available for viewing. The images can then be downloaded to the mobile device.

Planmeca also introduces Planmeca Online, a free secure service that allows sharing of images between clinics that use Planmeca Romexis. For example, a radiology centre can send images directly to its customer clinic automatically. When using the Planmeca iRomexis over a public Internet connection, the free Planmeca Online account ensures secure delivery of images to the user’s device. Please visit http://online.planmeca.com for more information.

“This new service emphasises our commitment to R & D and best practices in dentistry. Planmeca provides the most advanced tools—3-D imaging units and software—for acquisition and sharing of images and information for the benefit of patients. This concept also opens interesting future possibilities in communication and sharing of medical information between Planmeca’s customer clinics, while taking into consideration HIPAA and other patient safety requirements,” explained Helianna Puhlin-Nurminen, Vice-President of the Digital Imaging and Applications division at Planmeca.

The product is based on the recognised Planmeca Romexis desktop software suite that supports both MS Windows and Apple Mac operating systems, and includes processing of all dental imaging modalities: intra-oral, panoramic, cephalometric, and 3-D imaging. Planmeca iRomexis is now available for use with all new and existing installations. Planmeca iRomexis and the Planmeca Online service are compatible with Planmeca Romexis version 2.6.R or newer.

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Sponsored by the New York County Dental Society and the Second District Dental Society
IADR/Straumann Award in Regenerative Periodontal Medicine presented to Prof. Anton Sculean

At the general session of the International Association for Dental Research (IADR), held at Iguacu Falls in Brazil, the 2012 IADR/Straumann Award in Regenerative Periodontal Medicine was presented to Prof. Anton Sculean from the University of Bern, Switzerland, in recognition of his outstanding work and achievements in periodontal medicine.

"Prof. Sculean has contributed significantly to our understanding of oral tissue regeneration throughout his career," noted Kantarci. "As a preclinical and clinical investigator, he has evaluated all major approaches to periodontal regeneration. Furthermore, he has been an outstanding educator, a respected leader and a strong advocate of evidence-based regenerative medicine. In view of his continued active involvement and impressive output over the past ten years, the PRG board was unanimous in its decision to nominate him for this highly prestigious award," he added.

Worth US$5,000, the IADR/Straumann Award in Regenerative Periodontal Medicine is sponsored by Straumann and administered by the Periodontal Research Group. Straumann is a leading contributor to R & D in implant and regenerative dentistry and this award is an example of the group’s commitment to fostering and recognising excellence in dental research.

About the International Association for Dental Research

Based in Alexandria, Virginia, USA, the IADR is a non-profit organisation with more than 12,000 individual members worldwide, dedicated to advancing research and increasing knowledge to improve oral health, supporting the oral health research community, and facilitating the communication and application of research findings for the improvement of oral health worldwide.

For more information on the IADR, see www.iadr.org. Within the IADR, the Periodontal Research Group is the forum for members who are active in periodontology. Its aim is to improve periodontal health by encouraging research activities.
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Art nouveau—A Viennese Gesamtkunstwerk

Author: Annemarie Fischer, Germany

_Blossoming colours, golden ornaments, structuralist style, and sensual representation—this year marks the 150th anniversary of the artist Gustav Klimt. This is the time to indulge in this art nouveau style, and the place to enjoy his oeuvre is Vienna: Klimt’s native Vienna is celebrating the distinguished painter with the Klimt Year 2012 jubilee.

Luscious flowers merging into elegant female figures and organic ornaments crafted into luxurious jewellery epitomise art nouveau (Jugendstil in German and Modern in Russian) at the end of the 18th century, fin de siècle. Its style, which has a variety of names, constitutes a global movement, and its spirit is as colourful as its style. Its oeuvres still dazzle the global art scene with record-breaking prices, and even centuries after its peak period, its style is still copied in interior design and jewellery.

The art nouveau concept combines the arts into a form of “syn-arts”, truly in the spirit of breaking and merging boundaries—merging arts and crafts from high culture to the everyday, combining the sensual and the crafted, connecting the organic earthiness to the artistically elevated, and striving for the creation and the realisation of the synaesthetic Gesamtkunstwerk.

Gustav Klimt spent most of his life in Vienna, and a trip to Vienna offers a synaesthetic experience: the city not only celebrates the extraordinary, but also appreciates the art of the ordinary—with architecture and artworks to enjoy, and cuisine in which to indulge.

There are several museums now offering special exhibitions, notably the Belvedere and the Albertina, as well as the Leopold Museum in the avant-garde MuseumsQuartier—explore the quarter’s designer shops for unique souvenirs.

Moreover, one can trace Klimt’s influential artwork in the numerous cityscapes and in a variety of monuments, notably in the Viennese Secession art house—the ideal starting point for a Klimt journey. The golden-green Secession art house still hosts the Beethoven Frieze [Beethovenfries]—a wall painting that is part of the “Close-up” exhibition. During the
The former Austro-Hungarian era, the name “Secession” served as a synonym for “art nouveau”, and its motto is still engraved above the entrance: “To every age its art. To art its freedom.” [Der Zeit ihre Kunst. Der Kunst ihre Freiheit.]

Within walking distance to the Secession, the Albertina impresses with its astonishing architecture and permanent collections. The special Albertina exhibition “The Drawings” frames the Klimt with an exploration of his artistic methodology and mediums. Klimt created fascinating effects with various means, and the exhibition features drawings created with pencil, chalk, or coloured pencils, and painted with feathers, watercolours, or gold paint.

The Leopold Museum offers the most avant-garde and audience-oriented perspective display, and sets out to understand the painter, as well as the human being, in its exhibition “Klimt: Up Close and Personal”. Paintings, including the vital *Death and Life*, drawings and correspondences explore both the artistic and artist’s life in an innovative setting, offering novel and holistic perspectives. The Leopold Museum illuminates Klimt’s artistry with his own reflections on his working methods. Vivid photographic images of his typical artistic attire and the reconstruction of his studio support the museum’s theme impetus of “up close and personal”—whilst avoiding myths and clichés.

The museum offers a vintage-communication experience to the visitor: from the museum’s own post office, one can send reproduced postcards to loved ones at home—Klimt himself was an avid letter writer.

Gustav Klimt’s artistry was avant-garde for his time and his most famous oeuvre, *The Kiss*, advanced as an epitome of the fin de siècle ambiance and emerged as one of the art nouveau icons. In the image, gold is not only employed as a mere luxury material; the usage of the material reflects the aura of human emotion. Klimt’s famous canvas is part of the Upper Belvedere, and the Belvedere gardens offer an ideal setting for wandering around.

If you would like a holistic perspective on art nouveau for your personal library, the recently published *Jugendstil [Art Nouveau]* by Norbert Wolf (2011) is a true Gesamtkunstwerk. The book is gold framed in a larger-than-life-format, and even its font is adapted to the art nouveau style. The author offers a multi-perspective and global view on the art movement. From everyday objects to haute couture and high culture, the book offers a holistic insight into the global movement and places a special focus on Gustav Klimt and Viennese architecture from its opulent beginnings to contemporary designs.

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*The Secession, Association of Visual Artists, Friedrichstraße 12, open Tuesdays to Sundays, from 10:00 to 18:00, www.secession.at*

*Leopold Museum, Museumsplatz 1, open daily (except Tuesdays) from 10:00 to 18:00, Thursdays from 10:00 to 21:00, www.leopoldmuseum.org*

*“Gustav Klimt. The Drawings” exhibition, Albertina, Albertinaplatz 1, open daily from 10:00 to 18:00, Wednesdays from 10:00 to 21:00, www.albertina.at*

*Belvedere, Prinz Eugen-Straße 27, open daily from 10:00 to 18:00, www.belvedere.at*
At the beginning of June, dental professionals from all over Europe gathered at the Reed Exhibitions Congress Center in Vienna for the Europerio 7 congress. The scientific event, organised by the Austrian Society of Periodontology on behalf of the European Federation of Periodontology (EFP), presented the latest research and technology in the fields of periodontology and dental implantology over the course of three days.

The congress was opened in the presence of representatives of 26 member associations of the EFP, who presented on stage with their respective flags during the welcome ceremony. Among others, the delegates were addressed by EFP General Secretary Stefan Renvert (Sweden) and Chairman of the Europerio 7 Organising Committee Dr Gernot Wimmer (Austria), who also paid tribute to several members of the Vienna School and pioneers in oral biology, including Rudolf Kronfeld and Bernhard Gottlieb, after whom the Medical University of Vienna’s dental school was named.

“Thanks to the work of many, we have a fantastic congress ahead of us,” Renvert said in the lead up to the conference.

According to the organiser, Europerio 7 was aimed at both general practitioners and specialists. Over 100 speakers from Europe and overseas presented the latest insights into the management and treatment of periodontal disease, as well as aspects of dental implant therapy, in over 60 lectures and workshops. A large number of sessions were dedicated to pre-existing medical conditions. In two of the main sessions (periodontal medicine, and risk factors and their management), reference were made to important associations with diabetes, obesity and cardiovascular disease, the organiser said.
The scientific programme started with presentations on periodontal plastic surgery and new insights into the host response in periodontitis, alongside sessions on computer-guided treatment in dental implantology and dental hygiene. In addition, posters were presented throughout the day. According to the organiser, over 1,300 abstracts were submitted for Europerio 7, a 60 per cent increase compared with the last congress.

The event received support by a number of major industry players, including Straumann, Philips, Acteon, MIS and Nobel Biocare, which sponsored a number of seminars and corporate workshops during Europerio 7. New products and technologies were on display during the trade exhibition, which was joined by over 100 companies from around the globe.

"With its particular emphasis on research that will address the global scientific community and give them a forum, my expectations for this conference and its reception are especially high," Dr Gernot Wimmer told Dental Tribune Austrian Edition. "From a professional viewpoint, I am eager to see the results of the attendance at our different events, as these evaluations will be vital for the planning of future congresses."

This year was the seventh time that the EFP had organised the congress in collaboration with one of its member periodontal societies. The federation, which is based in Madrid, was founded in 1991 in order to facilitate research in periodontology and dental implantology. Its main congress is held every three years in different host cities in Europe. The last congress in Stockholm in 2009 saw the attendance of over 6,600 visitors from 82 countries.

The next Europerio congress will be held in 2015 in London.
Digital technologies in use in the dental practice and laboratory, new CAD/CAM processes, modern software for networking and work processes will be some of the main topics during IDS.

Its presence in the media, the expectations of patients, and not least its record of success in the dental practice and laboratory demonstrate that there is now no avoiding digital technology in the world of dentistry. Information about CAD/CAM systems and intra-oral scanners fill whole special editions in the dental press. Beyond treatment-related applications, software for accounting, purchases and documentation is also gaining in importance. Ever since dentists have been legally required to practise systematic quality management, computer-supported solutions have been increasingly in demand in that area as well. There is already brisk competition in the relatively young digital marketplace. Many companies are therefore continually increasing their efforts when it comes to development, especially in this sector. As a result, large numbers of innovations, new programs and more effective interfaces are keeping the area of digital technology on the move. In order to keep up with the fast pace of development, it is essential to establish direct contact with manufacturers and their products—and that is most easily achieved at the world’s leading and largest dental medicine and technology trade fair, the International Dental Show (IDS) in Cologne.

An excellent example of the strength of innovation in the dental industry is provided by the CAD/CAM-assisted production of dental prostheses. Among other factors, increasingly precise processes for centralised production lead to results that fit well and that save time and money. Modern programs can also help to make communicating with patients easier by providing a means of demonstrating the results before treatment begins. In this situation, these programs can help to noticeably reduce the time it takes to motivate patients and get them involved in the planning of their prostheses.
In order to serve the needs of patients even better, many dentist/dental technician teams use intra-oral scanners nowadays. Scanning replaces traditional impression taking and speeds up the workflow because information can be passed on digitally. Additionally, the problem of a sensitive gag reflex is eliminated. This reflex, which some patients find uncomfortable, often occurs when an impression material is used.

The transition to a digital practice and laboratory also includes areas beyond actual treatment. Modern IT systems provide for seamless networking. Useful software for ensuring data integrity, inventory control and billing, for example, is included in complete solution packages—as are indispensable tools for quality assurance and digital documentation.

Those interested in the many new developments in this sector would be well advised to consult directly and personally with the manufacturers at IDS 2013 in Cologne. From 12 to 16 March 2013, dentists and dental technicians will be offered the unique opportunity to not only experience all the latest innovations live, but also take advantage of the expertise of the dental industry during extensive technical discussions.

"The fact that the future will be digital was already clear at the last IDS," according to Dr Martin Rickert, Chairman of the Association of German Dental Manufacturers (VDDI). "Anyone who doesn’t want to miss out on the latest trends should talk to specialist exhibitors, experts and experienced users at the coming International Dental Show. There’s no better way to become well informed about the range of modern digital methods and the newest high-tech developments."

IDS takes place in Cologne every two years and is organised by the Society for the Promotion of the Dental Industry (Gesellschaft zur Förderung der Dental-Industrie) and the commercial enterprise of the VDDI, and staged by Koelnmesse, Cologne.
International Events

2012

XXI Congress of the European Association for Cranio–Maxillo–Facial Surgery
11–15 September 2012
Dubrovnik, Croatia
www.eurofaces.com

AAID Annual Meeting
3–6 October 2012
Washington, USA
www.aaid-implant.org

CAD/CAM & Computerized Dentistry International Conference
6 & 7 October 2012
Singapore
www.cappmea.com

EAO
10–13 October 2012
Copenhagen, Denmark
www.eao.org/eao-congress

SA Society of Maxillofacial Oral Surgery
11–14 October 2012
Cape Town, South Africa
www.sasmfos.org

Nobel Biocare Symposium 2012
19 & 20 October 2012
Toronto, Canada
www.nobelbiocare.com

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Rimini, Italy
www.nobelbiocare.com

AAMP (joint meeting with ISMR)
27–30 October 2012
Baltimore, USA
www.res-inc.com/AAMP-ISMR-Meeting/

National Osteology Symposium Brazil
8–10 November 2012
São Paulo, Brazil
www.osteology.org

Greater New York Dental Meeting
23–28 November 2012
New York, USA

2013

International Dental Show
12–16 March 2013
Cologne, Germany
www.ids-cologne.de

FDI Annual World Dental Congress
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Istanbul, Turkey
www.fdiworlddental.org
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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.

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m.wojtkiewicz@dental-tribune.com
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