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cosmetic dentistry

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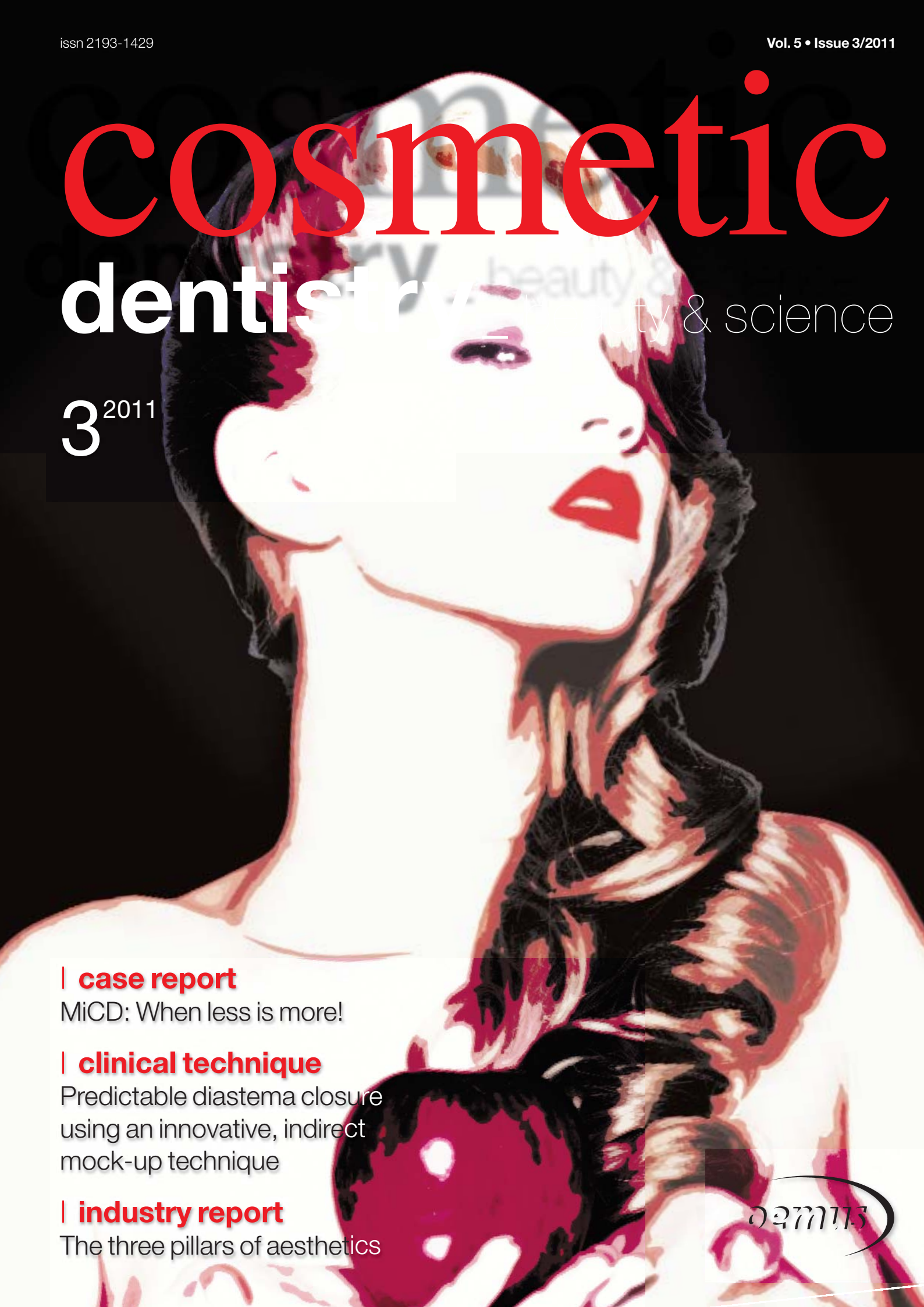

case report

MiCD: When less is more!

clinical technique

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industry report

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Dear Reader,

Dr So Ran Kwon
Co-Editor-in-Chief

_Welcome to this year's third edition of cosmetic **dentistry**! I hope you enjoyed the first and second editions, which are also available online at www.dental-tribune.com free of charge so that we can truly share our expertise and knowledge.

I have been a member of the Asian Academy of Aesthetic Dentistry (AAAD) for many years and recently also became a member of the American Academy of Esthetic Dentistry. Another change in my professional life has been the transition from being a private practitioner in Seoul, Korea, to an appointment as full-time associate professor at the Department of Restorative Dentistry and Center for Dental Research at Loma Linda University's School of Dentistry in California. Therefore, it is with great excitement that I would like to use this opportunity to serve as a bridge for the East and the West to work together in harmony for the progress of cosmetic dentistry. I am confident that our magazine will aid in this goal for collaboration.

Global cosmetic dentistry is on the way! The Japan Academy of Esthetic Dentistry (JAED) with its nearly 3,000 members and the Korean Academy of Esthetic Dentistry (KAED) with its more than 2,000 members have been very strong pillars in supporting the AAAD. The JAED, under the leadership of its President, Dr Toru Sato, established a collaboration with the American Academy of Cosmetic Dentistry (AACD) last year. This year, the KAED, headed by Dr Myung-Jin Kim, followed this example. The AACD is recognised as the largest cosmetic academy worldwide with more than 7,000 members. The collaboration of the academies will lead to a continuous exchange of speakers between the academies and I hope that there will also be more submissions of informative articles to cosmetic **dentistry**.

This colourful edition is concerned particularly with minimally invasive dentistry using composites and with relevant industry reports on adhesive systems and composite resin materials. You will also enjoy information on meetings and international events and much more. I sincerely hope that you will enjoy this edition and successfully apply the information to your clinical practice.

Yours faithfully,
Dr So Ran Kwon

Co-Editor-in-Chief
President, Korean Bleaching Society
Seoul, Korea


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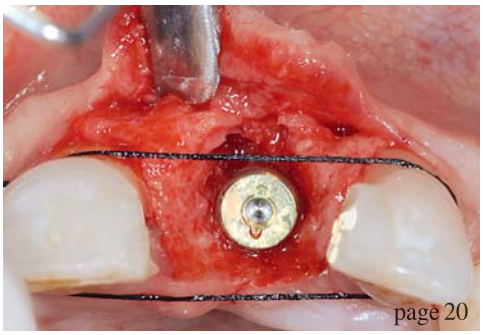
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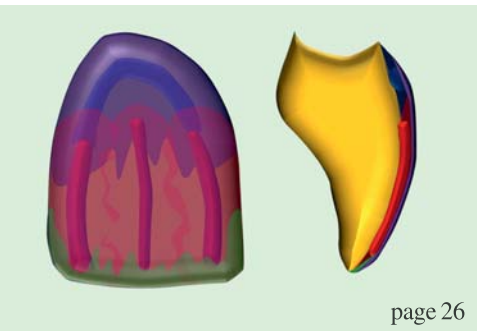
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*[1] Source: K. Huber, G. C. Lier, B. Bott, and M. Hanning: Marginal Adaptation of Composite Resin Restorations Using Self-etching Adhesives, Joint Meeting of the Continental European, Israeli, and Scandinavian (NOF) Divisions of the IADR, Abstract #59, August 25-28, 2004.
*[2] Source: B. Van Meerbeek, M. Peumans, A. Poitevin, A. Mine, A. Van Ende, A. Neves, and J. De Munck: Relationship between bond-strength tests and clinical outcomes, Dental Materials 26, e100–e121, 2010.

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SCIENCE. KNOWLEDGE. SUPPORT.

Minimally invasive cosmetic dentistry: When less is more!

Author_ Assoc Prof Adrian U.J. Yap, Singapore

_**Minimally invasive dentistry (MiD)**, also known as minimal intervention dentistry and preservative dentistry, is a practice mindset and philosophy. There is no escape from MiD in clinical practice. All clinicians practice MiD periodically whether consciously or unconsciously. As a practice philosophy, there are principles of being, knowledge and/or conduct.

Although MiD relates to most oral diseases and aspects of dentistry, its application to caries is probably the most evolved. Carious lesions that are demineralised and non-cavitated are now "healed" instead of surgically removed. Tyas *et al.*[1], as part of a FDI Commission-initiated project, provided an overview of the principles and concepts of MiD, suggested techniques and presented the results of clinical studies as they pertain to dental caries. The principles of MiD in relation to caries management are:

_remineralisation of early lesions;
_reduction in cariogenic bacteria, in order to eliminate the risk of future demineralisation and cavitation;
_minimum surgical intervention of cavitated lesions;
_repair rather than replacement of defective restorations; and
_disease control.

Based on these foundational tenets, generic MiD principles can be proposed for all oral diseases. They are:

_early detection and diagnosis of disease (D);
_control of contributing (predisposing, precipitating and/or perpetuating) factors (C);
_curative and least invasive management of disease or pathological effects (M); and
_assessment and monitoring of intervention outcome (O).

These tenets are not only applicable to dental caries, but also to aesthetic problems causing patients "dis-ease". Dental aesthetic problems, like other diseases, can be caused by genetic or developmental anomalies, infection agents (e.g. caries and periodontal disease) and/or environmental factors (malnutrition, diet, stress, trauma, etc.) and include:

_discoloured teeth;
_poorly shaped teeth;
_broken or worn teeth;
_ugly fillings (secondary to dental caries);
_spaces between teeth;
_crooked teeth; and
_missing teeth.

Non-invasive options	Minimally invasive options
Smile training	Aesthetic recontouring of teeth/gums
Remineralisation of white spot lesions	Direct restoration with micro-preparation, air abrasion and laser
Take-home and in-office bleaching	Direct or indirect veneers
Direct veneers without tooth preparation	Inlays, onlays and partial veneer crowns
Bonded pontics	Adhesive bridges
Bruxism guards	Dentures
Sectional orthodontics	Mini-implants
	Orthodontics

Table I

Table I_MiCD treatment options for managing various aesthetic problems.

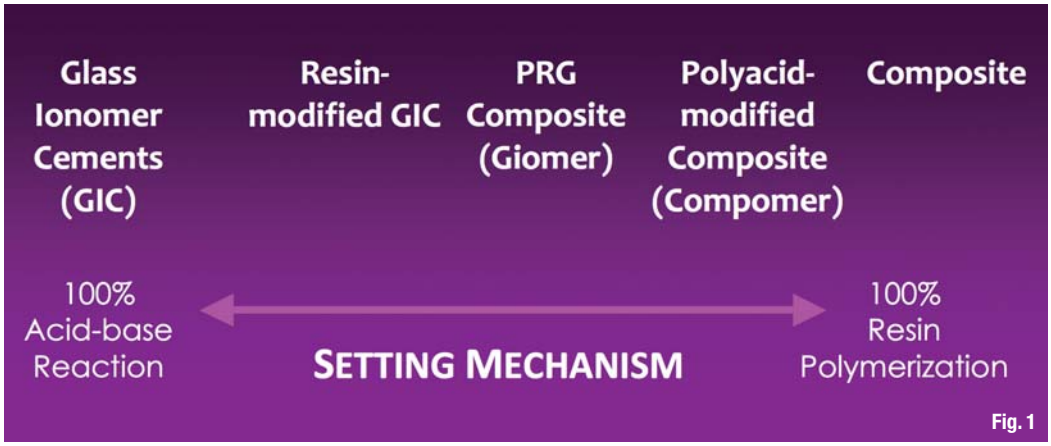

Fig. 1_Continuum of direct restorative materials used in MiCD.

Minimally invasive cosmetic dentistry (MiCD) aims to correct the afore-mentioned aesthetic disease and to fulfil patients' aesthetic desires and demands by using conservative and minimally invasive treatment options. The least amount of dentistry is performed and any tooth structure removal is kept to the absolute minimum required to achieve the desired aesthetics. The benefits of MiCD are highlighted by Koirala[2] and include reduction of dental fear, increased patient confidence, promotion of trust, enhancement of professional image, tooth preservation and reduction of treatment cost.

Treatment options can be broadly classified as non-invasive or minimally invasive and are listed in Table I. To achieve optimal aesthetic results, more invasive procedures, including conventional implants, periodontal surgery and crown therapy, are sometimes required to complement MiCD treatment options.

_MiCD materials

In view of the varied procedures, the entire range of materials used in MiCD is beyond the scope of this article. Emphasis is placed on direct aesthetic restorative materials that conserve the maximum amount of tooth structure because they are utilised in the majority of MiCD procedures performed in clinical practice. The continuum of direct restorative materials used in MiCD, based on their setting chemistry, is shown in Figure 1.

Glass ionomer cements (GICs) consist of basic glasses (calcium or strontium fluoro-aluminosilicate) and acidic co-polymers (polyalkenoic acids) that set through an acid–base reaction. The set cement consists of the original glass particles sheathed by siliceous hydrogel and bonded by a poly-salt matrix. Although their aesthetics is fair, they release fluoride and can chemically bond to tooth tissue. GICs also shrink minimally on setting and have a similar coefficient of thermal expansion to dentine.

Indications for the highly viscous version of these cements include the restoration of non-stress-bearing areas of anterior and posterior teeth and "open-sandwich" restorations. The latter involve the use of glass ionomer as a base under composite restorations. Resin-modified GICs were developed to overcome the early moisture sensitivity of conventional cements. In addition to decreasing moisture sensitivity, resin modification also improves setting characteristics, aesthetics, physical and handling properties. The resin is typically incorporated by substituting acidic co-polymers with a water–HEMA (hydroxyethyl methacrylate) mixture or the use of acidic co-polymers with methacrylate side chains. Despite the addition of resin,

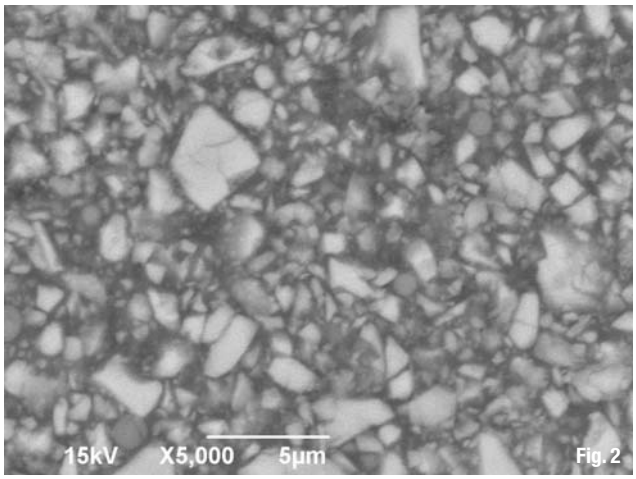

Fig. 2_SEM image of a giomer restorative with the PRG filler particles. (Image courtesy of SHOFU)

which usually constitutes 4.5 to 6 % of the set material, resin-modified GICs retain a significant acid–base reaction as part of their overall curing process, bond chemically to teeth and are capable of fluoride release and re-charge. Their caries preventive effect[3] and clinical uses are similar to those of their conventional counterparts.

Composites, compomers (polyacid-modified composite) and giomers (pre-reacted glass ionomer composite) all require resin polymerisation to set

and intermediary bonding agents (micromechanical bonding) to adhere to teeth. They can be employed to restore all cavity classes (Class I to VI) and are especially useful for direct veneers and bonding.

Composite resins consist of a resin matrix (commonly bisphenol A-glycidyl methacrylate [Bis-GMA] or urethane dimethacrylate [UDMA] with triethylene glycol dimethacrylate [TEGDMA] as a diluent monomer), ceramic fillers (amorphous silica and silicate particles) with coupling agent and minor additives such as initiators, activators, colouring pigments and stabilisers. Resin polymerisation can be activated chemically and/or by light. Composite resins have excellent aesthetics, physical properties and handling but are technique sensitive and shrink on curing (ranges from 1 to 5 % by volume). Compomers contain the essential components of GICs. The acid component is, however, dehydrated and incorporated in the resin matrix. After light curing, the acid–base reaction occurs slowly when the dehydrated acid is activated through water sorption resulting in a partially ionic structure within the resin matrix. Compomers are capable of fluoride release but the total fluoride release and re-charge is significantly lower than that of GICs.[4] The water sorption needed for the acid–base reaction to take place has been shown to compromise the aesthetics and physical properties of compomers.[5]

Fig. 3_Panoramic radiograph of the patient.

Giomers are the most recent category of hybrid restorative material. They are touted as a true hybridisation of composites and GICs because they have the fluoride release and re-charge of GICs and the aesthetics, handling and physical properties of composite resins. Giomers are based on PRG technology in which pre-reacted GICs are used as fillers (Fig. 2). Currently available commercial products are based on S-PRG in which only the surface of the glass fillers are reacted with polyacid and a glass core remains. Examples of giomer restorative products include Beautifil II and Beautifil Flow Plus (SHOFU).

The fluoride release and re-charge of giomers are significantly better than that of compomers but lower than GICs.[4,6] A recent study has reported reduced dental plaque formation and bacterial adherence on giomers when compared with composite resins.[7] This had been attributed to the formation of a material film layer on the surface of giomer restorations after contact with saliva. This material film layer, which consists of aluminium, silica, strontium and other ions, originates from the PRG filler and has also been observed with GICs.[8]

The clinical performance of giomer restorations has been evaluated in several studies involving Class I, II and V cavities up to eight years of duration. After three years, Matis *et al.*[9] found no significant difference between giomer and micro-filled composite restorations in all the parameters evaluated. Gordan *et al.*[10] evaluated the performance of giomer restorations over eight years and report no restoration failure. Significant changes were detected only for marginal adaptation at occlusal surfaces and marginal staining at proximal surfaces. Although recurrent or secondary caries is a major cause of restoration failure,[11] this was not observed with giomer restorations. The latter may be accounted for by their better demineralisation inhibition effect at the margins of restorations when compared with compomers and composites.[12]

_MiCD in clinical practice

The spectrum of MiCD procedures and techniques involving the use of direct restorative materials has been extensively covered.[13] The modification of tooth colour, shape, size, position and defects, as well as the replacement of missing teeth, can be conservatively achieved with no to minimal tooth preparation. Psychological (perception, personality, desire), health (general, specific, dentogingival), functional (occlusion, phonetics, comfort) and aesthetic (macro, mini, micro) factors must be considered when designing a smile and this has been incorporated by Koirala into a Smile Design Wheel.[2]

The following case presentation highlights the key principles of MiD (DCMO) as it applies to aesthetic dis-ease and precautions related to MiCD.

_Case study

A 43-year-old female patient was referred by her general dentist for management of her aesthetic

Clinical signs	Radiographic signs	Symptoms
Increasing tooth mobility	Angular bony defects	Sensitive, painful or sore teeth
Fremitus and migration of teeth	Increased width of periodontal ligament space	Uncomfortable, uneven or "lost" bite
Cracked or fractured teeth/restorations	Increased width of lamina dura	Occlusion-related periodontal pain
Abfraction cavities	Changes in alveolar bone	Symptoms of temporomandibular disorders
Occlusal wear and heavy occlusal contacts	Vertical reduction of interdental septum	
Occlusal discrepancies	Root resorption	
Soft tissue indentations	Furcation defect	
Signs of temporomandibular disorders		

Table II

Table II_Signs and symptoms of occlusal disease.

problems for social reasons. She had congenitally missing lateral incisors, a history of multiple tooth fracture and was unhappy with the spaces and shape of her upper anterior teeth. With the exception of her upper right second molar, all upper molars and second premolars were lost owing to fracture. Her posterior support was derived solely from her first premolars because she had a missing lower right second molar (Fig. 3) and did not have an upper denture. Although her upper right first premolar was crowned and her left first premolar was "pristine", both teeth were cracked.

Early detection and diagnosis of disease

The patient's aesthetic problems were exacerbated by developmental anomalies (congenitally missing laterals) and environmental factors, including occlusal disease (OD). Occlusal disease is defined as "the process resulting in the noticeable loss or destruction of the occluding surfaces of the teeth".[14] The disease process is caused primarily by parafunction, especially sleep bruxism. The detrimental effects of OD could have been greatly minimised by early detection and management with a bruxism splint. Occlusal considerations are particularly important in MiCD because they have a significant impact on restoration success. The clinical and radiographic signs and symptoms of OD are listed in Table II.

As part of the diagnosis process, quality of life issues must be explored in addition to the usual history taking, examination and special tests (e.g. electric pulp test, salivary function test). Discussion of quality of life issues should focus on patients' wants, needs and expectations with regard to:

_appearance;
_tooth sensitivity;
_tooth or restoration fracture or failure;
_soft tissue discomfort;
_loosening or moving teeth;
_bite problems; and
_jaw pain and dysfunction.

If MiCD is planned in the presence of OD, patients must be educated on the advantages and disadvantages of MiCD to conventional therapy, the possibility of failure and need for protection. The patient concerned was aware of her occlusal problems but wanted a quick, non-invasive and economical solution to improving her anterior aesthetics in view of a social commitment.

Fig. 4a_Pre-treatment.
Fig. 4b_Post-treatment.


Fig. 4a

Fig. 4b

Control of contributing factors

As part of the patient's MiCD treatment planning, all factors contributing to the aesthetic dis-ease must be addressed. Contributing factors can be divided into those that increase risk (predisposing), cause the onset (precipitating) or enhance the progression (perpetuating) of the problem. Sleep bruxism, malocclusion and the loss of posterior tooth support (leading to occlusal trauma to the remaining teeth or restorations) were significant issues for the patient concerned. The contributing factors and their treatment implications were discussed in depth. The need for posterior support and future protection with a stabilisation splint was highlighted and the provisional treatment plan was formulated.

Fig. 5_Fractured direct veneers on the upper canines.

Curative and least invasive management of disease or pathological effects

Treatment according to the MiCD approach was undertaken in consultation with the patient in view of time and cost constraints. Bonding was done to close the spaces between her upper central incisors and canines and direct veneers were used to modify the shape of her canines into lateral incisors (Figs. 4a & b). The restorations were achieved using giomer restoratives (Beautifil II and Beautifil Flow) and the flowable frame technique.[13]

Some minor aesthetic recontouring was also done to the right central incisor. Impressions were made after restoration placement in preparation of an immediate denture replacing all the patient's missing posterior teeth and the fractured upper first premolars. The patient was also informed of the possibility of implants (with sinus lift and bone augmentation), should a fixed option be desired later. The need for conventional crown therapy should the bonded restorations not be durable was also discussed.

Assessment and monitoring of intervention outcome

A follow-up appointment for the seating of the immediate denture was scheduled but the patient did not attend her appointment. She was very happy with the aesthetic outcome and only returned when her bonded restorations failed a few months later (Fig. 5). The lack of posterior tooth support and high occlusal stresses secondary to sleep bruxism resulted in the failure of the bonded restorations. The latter could have been avoided if an upper stabilisation splint had been worn during sleep. Assessment and monitoring of intervention outcome is extremely important when OD is present. If teeth fracture and wear down, restorations will perform no better unless all contributing factors are addressed.

_Conclusion

MiCD aims to correct aesthetic dis-ease and fulfil patients' aesthetic desires and demands through conservative and minimally invasive treatment. Generic minimum intervention principles were proposed for all oral diseases including aesthetic dis-ease caused by genetic or developmental anomalies, infection agents and/or environmental factors. These were:

_early detection and diagnosis of disease;
_control of contributing factors;
_curative and least invasive management of disease or pathological effects; and
_assessment and monitoring of intervention outcome.

The tenets were employed in a case study in which giomer restoratives were used. The latter are the most recent category of glass ionomer–composite hybrid restorative materials. They are particularly useful for MiCD procedures in view of their good aesthetics, handling and anti-caries properties._

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Predictable diastema closure using an innovative, indirect mock-up technique

Authors_ Prof So Ran Kwon & Prof Gerald E. Denehy, USA


Fig. 1

Fig. 1_Pre-op view of diastema.

Fig. 2_Photo-imaging technique to simulate space closure.

Fig. 3_Diagnostic wax-up on a study model.

_Diastema closure with direct composite restorations can be a conservative treatment modality to improve the appearance of a smile. However, without proper diagnosis and treatment planning even the simplest looking diastema can turn into a very disappointing situation for the patient, as well as for the dentist.

Diastemas can vary in number and size (Fig. 1). Causative factors include periodontal disease; traumatic occlusion; abnormal fraenulum; habits, including tongue thrust, tongue biting, nail biting; missing teeth (owing to accident or the congenital absence of a tooth bud); and hereditary factors.[1]

Treatment options for diastema closure depend on the number and size of the spaces and on the aesthetic demands of the patient. Orthodontic space closure should be considered, and is often the treatment choice, particularly for young patients.[2] However, there are many situations where orthodontic treatment is not an option. Restorative treatment modalities range from very conservative direct composite resin restorations, through less conservative porcelain veneers, to more invasive indirect full-coverage restorations.


Fig. 2


Fig. 3


Fig. 4


Fig. 5

Direct composite resin bonding may lack the permanency of indirect veneers and full-coverage restorations. However, conservation of sound tooth structure, less treatment time, ease of repair and the low cost of the treatment compared with other treatment modalities are very distinct advantages of direct bonding.

Visualisation of the final result is an important factor in the patient's acceptance of the treatment of diastema closures. Prior to direct resin bonding, several diagnostic steps and communication tools are available to present the anticipated treatment outcome to the patient. The simplest method of assessing the final outcome of a diastema closure is by means of using photo-imaging techniques of before and after images of the space closure (Fig. 2). Patients can then appreciate the outcome by looking at the modified image. However, photo imaging may pose a challenge to the clinician to reproduce exactly the modified after-image clinically or the final restoration will result in patient disappointment.

A diagnostic wax-up on a study model is a commonly used method to assess the treatment outcome and present it to the patient (Fig. 3). The technique is easy to use and helpful in evaluating the anticipated shape and anatomy of the tooth. Disadvantages of diagnostic wax-ups are lack of relevance of waxing technique to the composite application technique, inability to match colours and difficulty on the patient's side to relate it to the clinical outcome on his/her teeth.

An innovative indirect mock-up technique with composite resin on a vinyl-polysiloxane (VPS) model allows the clinician to practice the diastema closure case, and assess the final shape and colour of the restoration. The indirect mock-up can then easily be placed on the patient's teeth to present the anticipated outcome without taking too much clinical time. This indirect mock-up also allows the patient to truly appreciate the final outcome on his/her actual teeth. The procedure involves an alginate impression of the patient's teeth poured with a VPS material, upon which composite mock-ups of the anticipated restorations are done. These mock-up shells are then transferred to the patient's mouth for evaluation.

Fig. 4_Fast setting VPS material is poured into the alginate impression.
Fig. 5_Gingival contour is trimmed with a #12 blade to prevent formation of a black triangle in the gingival embrasure area.


Fig. 6


Fig. 7

Fig. 6_Application of composite material with an IPC instrument.
Fig. 7_Pull-through technique with a celluloid strip from facial towards lingual.

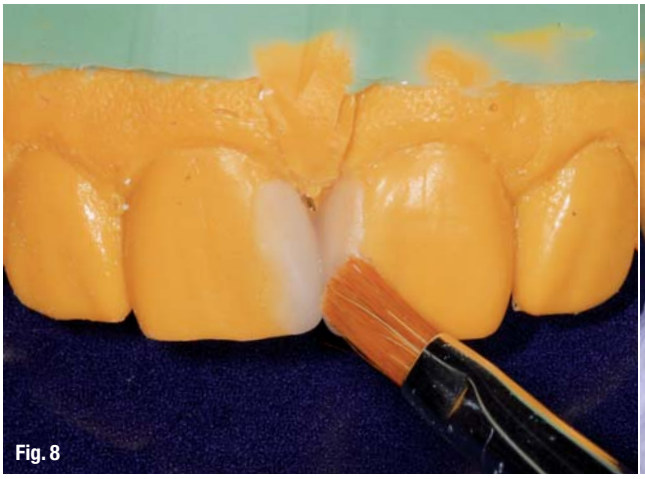
Fig. 8


Fig. 9

Fig. 8_Smoothening of the surface with a #3 synthetic sable brush.
Fig. 9_Careful removal of the butterfly-shaped indirect mock-up from the VPS model.

_Step-by-step procedure for the indirect mock-up technique

1. Take an alginate impression of the patient's diastema during the initial visit. The impression needs only to be of the anterior quadrant containing the diastema and a quadrant tray may be used if desired.
2. Immediately pour the alginate impression using fast set VPS material (Aquasil Ultra XLV, DENTSPLY), taking care to avoid bubbles (Fig. 4).
3. Measure width and length of central incisors and the diastema space on the VPS model. Typically, central incisors should be mirror images of each other, with similar width.
4. Trim the gingival tissue contour with a #12 scalpel blade to prevent formation of a black triangle in the gingival embrasure area (Fig. 5).
5. Place and contour a sculptable composite resin on one central incisor with a Gold Microfil instrument or IPC instrument, and smooth the surface with a #3 synthetic sable brush. The contour of the placed resin should produce the desired facial and proximal contours and extend lingually to just beyond the contact. It should not extend over the lingual marginal ridge. Light-cure the restoration (Fig. 6).
6. Continue the composite build-up on the opposite central incisor. Attach the resin material to the tooth and while maintaining a hold on the celluloid strip with a fingertip on the facial side, pull the strip from the facial towards the lingual to push the resin material through the proximal to form a smooth contour adapted properly in the gingival area of the tooth (Fig. 7). Use a #3 brush to shape the material to the desired contour proximally and to form contact with the adjacent tooth. Use a brush to refine the facial and gingival embrasures, and light-cure (Fig. 8).
7. Remove the polymerised resin restorations and transfer the butterfly-shaped indirect mock-up to the patient's mouth (Fig. 9).
8. The mock-up allows the patient to evaluate the aesthetic outcome of the proposed treatment (Figs. 10 & 11).

_Step-by-step procedure for the direct build-up of composite resin

1. Isolate the operative field with a retractor (OptraGate, Ivoclar Vivadent) and place re-

Fig. 10_Pre-op view of patient's smile.
Fig. 11_Placement of indirect mock-up into the patient's mouth to evaluate the outcome of the proposed treatment.


Fig. 10


Fig. 11


Fig. 12


Fig. 13


Fig. 14

traction cords (Ultrapak Cord, Ultradent) on teeth #8 and 9 after thoroughly pumicing the teeth. The proximal surfaces may be carefully cleaned with a sandpaper disc (Sof-Lex XT, 3M) or a contouring strip (Epitex, GC). Care must be taken not to damage the soft tissue and cause field control problems.

2. It is generally not necessary to prepare the teeth with a bur, but a Sof-Lex contouring disc can be used to roughen the enamel surface (Fig. 12).
3. The direct build-up of composite resin is performed according to the same sequence used on the VPS model (Fig. 13). The difference is that the portions of the restorations lingual to the contact and over the marginal ridge are established in a secondary step with the celluloid strip pulling the material from the lingual to the facial.
4. The final diastema closure with composite resin should have natural contours at the gingiva–tooth interface without a black triangle and smooth sub-gingival margins with no catch on flossing (Fig. 14).[3]

_Discussion

Presentation of the final treatment outcome is essential for proper communication with the patient. Several diagnostic tools are available; however, the illustrated innovative indirect mock-up technique with composite resin on a VPS model allows the patient to visualise the anticipated results in the mouth before agreeing to treatment. It also allows the clinician to actually practise the diastema closure case, and assess the final shape and colour of the restoration prior to performing direct bonding on the patient.

Since free-hand direct composite build-ups are often challenging to the clinician, this practice may help in providing a predictable and successful clinical outcome._

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

Fig. 12_Roughening of enamel surface with a Sof-Lex disc.
Fig. 13_Direct build-up of composite resin on tooth #8.
Fig. 14_Final diastema closure with composite resin.

_contact

cosmetic dentistry

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Basic technical properties of CLEARFIL SE BOND

Authors_Dr Toshimoto Yamada & Dr Junpei Sugizaki, Japan

Fig. 1

_Since Dr Raphael Bowen developed the Bis-GMA oligomer in the early 1960s and Dr Michael Buonocore introduced the phosphoric-acid etching technique for enamel cavity walls, followed by the development of dentine bonding, aesthetic adhesive resin composite restorations—in areas such as the occlusal surfaces of posterior teeth—were widely performed in Japan before any other country in the world. These aesthetic adhesive restorations have contributed greatly to the improvement of the oral health of the Japanese population.

About 30 years ago, Kuraray developed CLEARFIL BOND, which was the first generation of a clinically successful resin bonding containing phenyl-P monomer as an adhesion-promoting monomer. Thereafter, light-cure technology was introduced to resin bonding, leading to the development of the light-cured resin bonding agent CLEARFIL PHOTO BOND. As a next step, Kuraray began developing an easier-to-use and more biocompatible resin bonding agent, resulting in the introduction of the world's first self-etching resin bonding agent—CLEARFIL LINER BOND 2—which does not require water rinsing after priming. This type of resin bonding is known as two-step simplified bonding in the US.

Based on CLEARFIL LINER BOND 2, Kuraray further improved and simplified the system. The result was CLEARFIL SE BOND, which consists of a one-bottle primer and one-bottle bond. With CLEARFIL SE BOND, a truly two-step, self-etching primer resin bonding system was launched, that creates strong adhesion to both enamel and dentine.

_Composition of CLEARFIL SE BOND

The CLEARFIL SE BOND kit consists of a single liquid primer, a single liquid bonding agent and accessories. The primer has a self-etching effect, and comprises HEMA (2-hydroxyethyl methacrylate), hydrophilic dimethacrylate, MDP (10-methacryloyloxydecyl dihydrogen phosphate, adhesion-promoting monomer), N,N-diethanol-p-toluidine, D,L-camphor-quinone, and water. The bonding agent comprises silanated colloidal silica, bisphenol A diglycidyl-methacrylate, HEMA, hydrophobic dimethacrylate, MDP, N,N-diethanol-p-toluidine and D,L-camphor-quinone.

One significant feature of CLEARFIL SE BOND is that it saves time, since it is not necessary to rinse the primer with water or to evaporate the solvent with light airflow. As soon as the cavity surface has been treated with the primer, MDP is able to penetrate the cavity wall, self-etching mineral components of the tooth tissue and dissolving the smear layer created on the cavity walls during tissue reduction in 20 seconds. The subsequently applied bonding agent is able to strengthen the adhesion between the tooth tissue

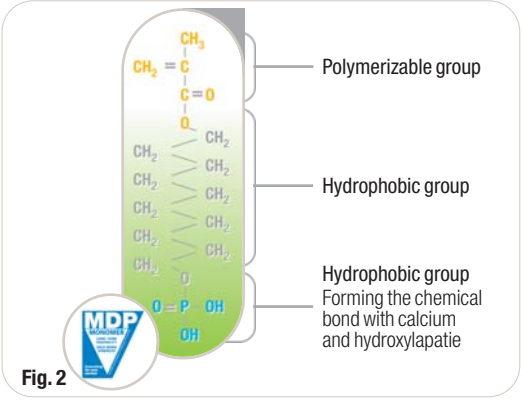


Fig. 2

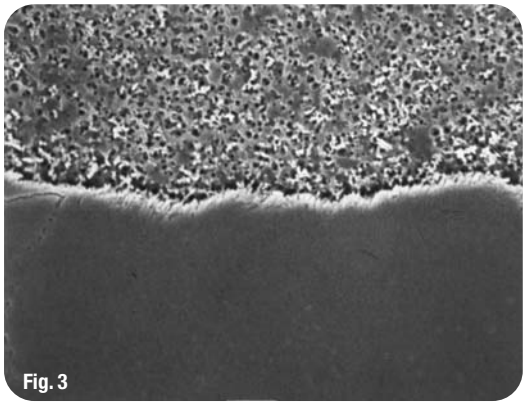


Fig. 3

Fig. 3_FE-SEM (argon ion beam etched surface; x 10,000) of the resin–enamel interface. The upper half is the set bonding layer and the lower half is the enamel layer. The superficial enamel was finely and densely etched.

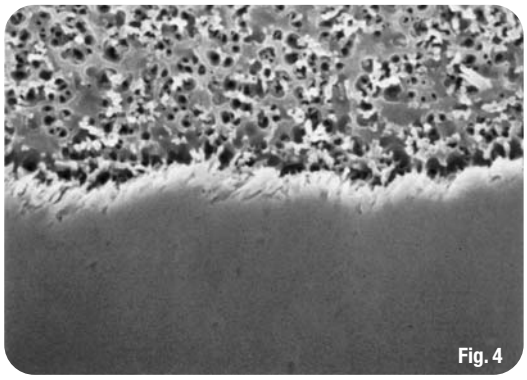


Fig. 4

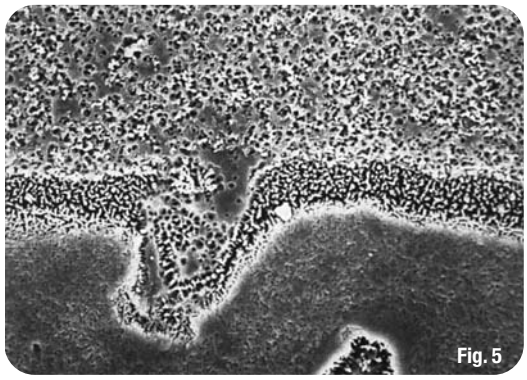


Fig. 5

Fig. 4_FE-SEM (argon ion beam etched surface; x 20,000) of the resin–enamel interface. The upper half is the set bonding agent loaded with micro-filler particles and the lower half is the enamel layer. The fine etching pattern of the superficial enamel layer is very clear.
Fig. 5_FE-SEM (argon ion beam etched surface; x 10,000) of the resin–intact dentine interface. The upper half is the set bonding agent and the lower half is the dentine layer. The junction between the resin and dentine was very tight through the hybrid layer of 1 µm in thickness.

and the placed resin composite paste after light irradiation for ten seconds.

Another important feature of CLEARFIL SE BOND is that the acidity of the primer is optimised to allow simultaneous treatment of both enamel and dentine layers. It is able to etch the enamel cavity wall enough to ensure good bonding, while not damaging the collagen structure of the dentine cavity wall excessively. Additionally, the primer remains diffused throughout the dentine tissue after treatment, since there is no rinsing away with water. Therefore, the collagen network structure in the dentine cavity wall prevents the structure from collapsing, and thus allows excellent penetration of the bond component throughout the supported dentine structure. The primer reverts to a neutral pH during treatment and demineralisation. The primer and bond are able to produce a strong and stable bonding layer with excellent dentinal sealing, which could contribute to much-reduced sensitivity.

Up until now, it was believed that self-etching primers were unsuitable for performing veneer restorations on discoloured teeth with a large enamel surface area in the cavity owing to the low etching effect of most primers. It has also been reported that marginal brown lines appeared along enamel margins when the existing self-etching primers were used to perform adhesive restorations. However, Kuraray has overcome this problem with other self-etching primers by enhancing and improving the mixture rate of MDP and other agents in CLEARFIL SE BOND.

_Adhesion of CLEARFIL SE BOND

The tensile bond strength of CLEARFIL SE BOND to tooth tissue was determined using extracted bovine teeth from the jaws of cattle freshly slaughtered on the morning of the test day and kept frozen until the afternoon. Because the dental pulps had not been removed, the adhesion tests were conducted under tough conditions.

The adhesion area was regulated at 3 mm in diameter and the tensile stress (cross-head speed) was set at 1 mm per minute. CLEARFIL AP-X resin paste was used as a restorative resin and 10 minutes after bonding, the bonded assemblies were stored in 37°C tap water. The tensile bond strength of CLEARFIL SE BOND was higher than 20 MPa to both bovine enamel and dentine.

The thermo-cycling test of 4,000 cycles (4~60°C) produced similar results in both the enamel and dentine. Since the resin is able to bond to enamel and dentine tissues at comparable strengths, the present system could be an ideal bonding system, and its bond strength is one of the highest amongst the resin bonding systems currently available. Additionally, since resins generally adhere to human teeth much more strongly than to bovine teeth, this would be true of CLEARFIL SE BOND too.

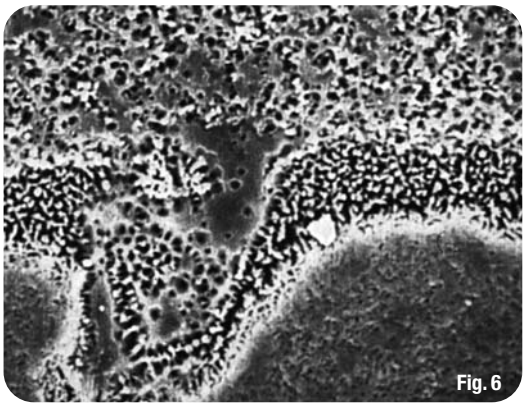


Fig. 6

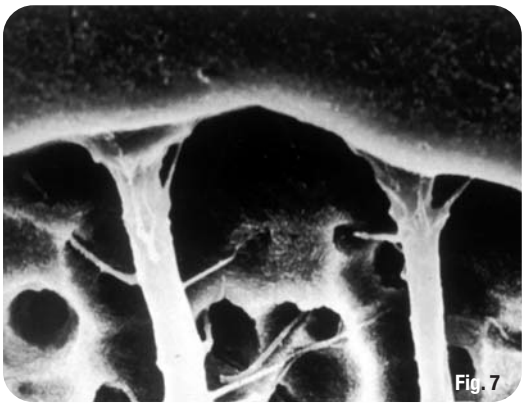
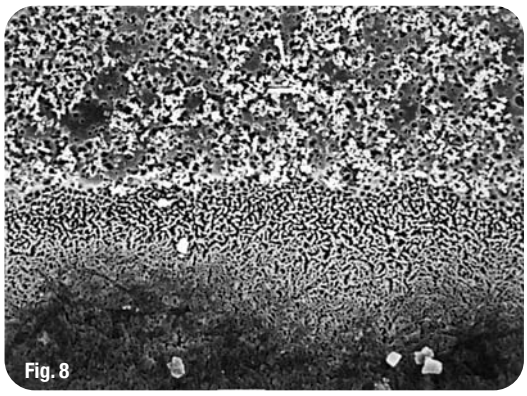


Fig. 7

Fig. 6_FE-SEM (argon ion beam etched surface; x 20,000) of the resin–intact dentine interface. When subjected to the argon ion beam etching, the hybrid layer was clearly demonstrated.
Fig. 7_SEM (hypochlorite treatment following phosphoric acid treatment; x 5,000) of the resin–intact dentine interface. The resin tags penetrated the dentinal tubules and penetrated lateral branches are presented. This demonstrates that the CLEARFIL SE BOND primer has a good treatment effect.



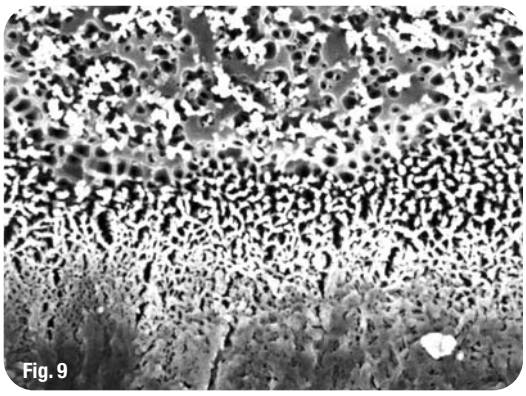


Fig. 8_FE-SEM (argon ion beam etched surface; x 10,000) of the resin–carious dentine interface. The upper half is the set bonding agent and the lower half is the dentine layer. The junction between the resin and dentine was very tight, and the hybrid layer in the superficial dentine layer was clear. But the junction between the hybrid and underneath dentine layer was not distinctive.

Fig. 9_FE-SEM (argon ion beam etched surface; x 20,000) of the resin–carious dentine interface. The junction between bonding, hybrid and dentine layer was tight and continuous.

_Electron microscopic examination of the interface between CLEARFIL SE BOND and human tooth tissue

FE-SEM of the resin–intact tooth tissue interface

The FE-SEM picture of the resin–enamel interface is shown in Figures 3 and 4. Both images present the resin–enamel interface subjected to the argon ion beam etching. The upper half is the set bonding layer and the lower half is the enamel layer. The superficial enamel was finely and densely etched, and the hydroxyapatite crystals of the enamel prism were decalcified. Nonetheless, this demineralisation process is not as destructive as that of conventional phosphoric acid etching, yet the junction at the resin-enamel interface was extremely tight, producing small and dense resin tags. The microfiller particles appear in the upper half of bonding layer.

Fig. 10

The FE-SEM picture of the resin–intact dentine interface is shown in Figures 5 and 6. The upper half is the set bonding agent and the lower half is the dentine layer. The junction between the resin and dentine was very tight and the hybrid layer of about 1 µm in thickness in the superficial dentine layer was very clear when subjected to the argon ion beam etching. The dentine was removed using 10 % phosphoric acid and 5 % hypochlorite (Fig. 7). The set resin tags penetrating the dentinal tubules were clearly demonstrated and small resin tags penetrating lateral branches of the dentinal tubules showed the improved treatment effect of the CLEARFIL SE BOND.

FE-SEM of the resin–carious dentine interface

The carious lesion of the extracted third molar was removed by means of the CARIES DETECTOR according to the routine technique. The prepared cavity was restored using CLEARFIL SE BOND and CLEARFIL AP-X resin paste. The resin–dentine interface is shown in Figures 8 and 9. The specimen was argon ion beam etched. The very clear hybrid layer was demonstrated in the superficial layer of dentine. The upper half is the set bonding layer, followed by the hybrid layer and dentine in the lower half. As shown in the FE-SEM pictures, CLEARFIL SE BOND showed tight adhesion to the carious dentine through the hybrid layer. These FE-SEM findings revealed that CLEARFIL SE BOND could adhere as well to the carious dentine as to the intact dentine.

_Conclusion

It has been about 30 years since the resin bonding system was introduced to dental operations. Today, anterior and posterior cavities are restored with resin bonding. The history of Kuraray's resin bonding systems is synonymous with the 30-year history of resin bonding. Modern resin bonding is able to decrease the treatment time, patient's discomfort and operator's mental and physical labour.

The most modern system is two-step, self-etching primer resin bonding, and is indicated not only for caries treatment, but also for repairing restorations in combination with Kuraray's ALLOY PRIMER or CLEARFIL PORCELAIN BOND ACTIVATOR. The CLEARFIL SE BOND is able to create a strong and stable bond to hard tooth tissue, and the resin composite paste is able to adapt excellently to the cavity walls treated by CLEARFIL SE BOND. Furthermore, moulding and shaping it is extremely easy. We thus believe that the CLEARFIL SE BOND resin bonding system will greatly contribute to global oral health._

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CDE 3/11

Single-tooth implants in the aesthetic zone— Challenge and opportunity

Author_ Dr Ata Anil, Turkey


Fig. 1


Fig. 2

Fig. 1_Initial clinical situation with fractured tooth 21.
Fig. 2_Corresponding X-ray with conservable root remains.

_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

Fig. 3_After atraumatic extraction the alveolar cavity is closed with a free gingival graft.
Fig. 4_The ovate pontic pre-forms the soft tissue.

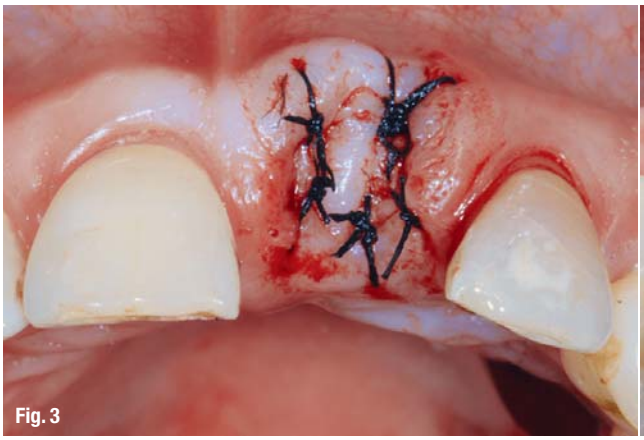
Fig. 3

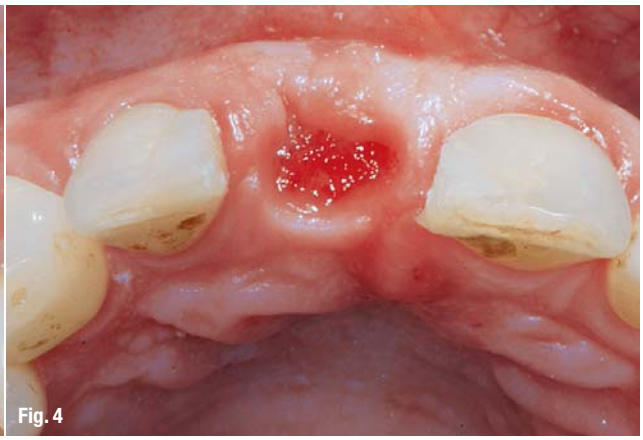
Fig. 4

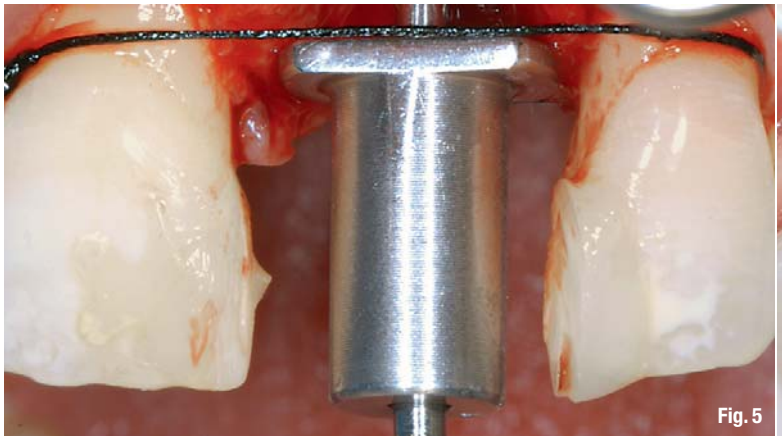
Fig. 5

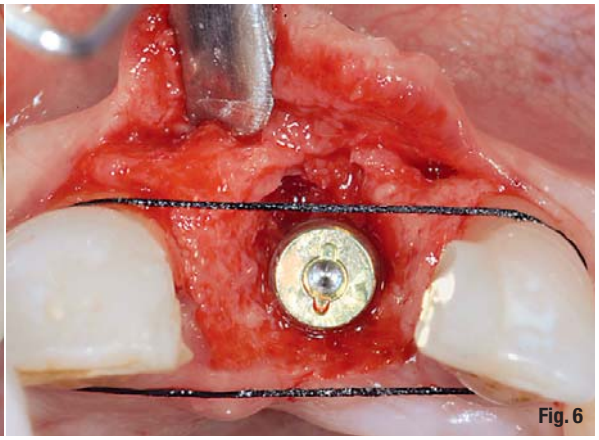
Fig. 6

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-

Fig. 5_Determining the ideal position for the implant with an Iglhaut locator and surgical suture materials.
Fig. 6_After insertion of the XiVE S plus implant, a 1 to 2 mm wide gap remains.

Fig. 7_An absorbable membrane and a connective tissue graft are placed over the implant and the filled defect.
Fig. 8_The flap is repositioned and sutured.

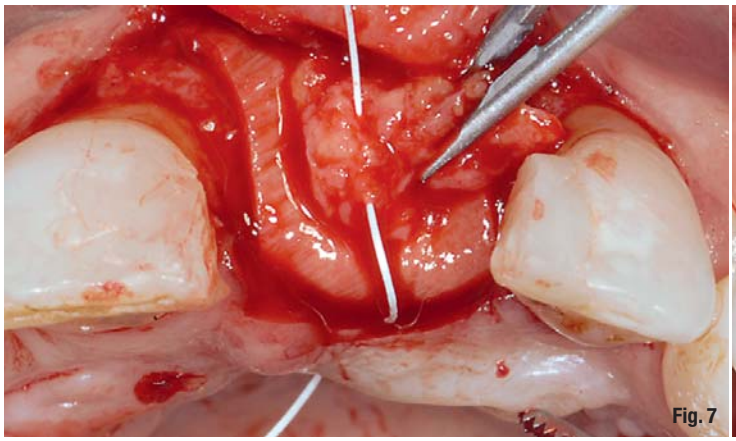
Fig. 7


Fig. 8

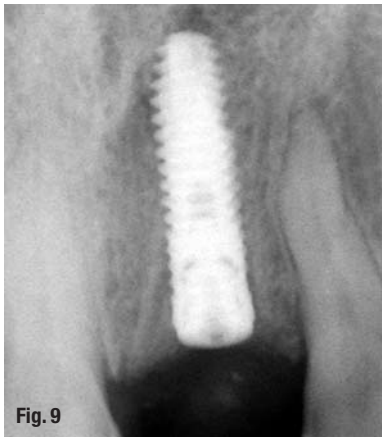
Fig. 9


Fig. 10

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).

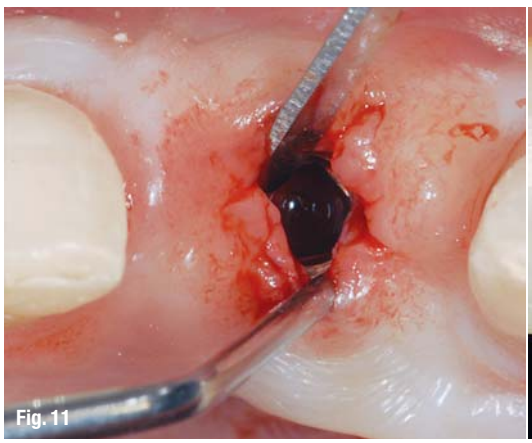
Fig. 11

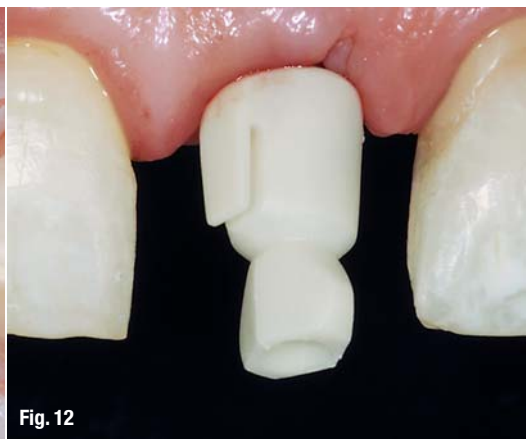
Fig. 12

Fig. 11_Uncovery of the implant with a scalpel.
Fig. 12_The TempBase Abutment is reinserted and fitted with a TempBase Cap as temporary treatment.


Fig. 13


Fig. 14

Fig. 13_The temporary crown, fabricated chairside and modified on the basis of the TempBase Cap, is pressed into position on the surrounding soft tissues.
Fig. 14_Fitting of the laboratory-customised CERCON abutment.

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 lenght) 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, uncovery 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


Fig. 15

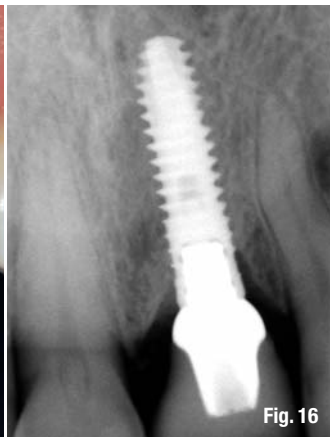
Fig. 16

Fig. 15_Final ceramic crown *in situ* adapts harmoniously to the overall picture.
Fig. 16_X-ray follow-up after three years demonstrates largely stable bone conditions.

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 discolouration 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._

Editorial note: This article was first published in IDENTITY 2/11. *A complete list of references is available from the author.*

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The three pillars of aesthetics

Authors_ Dr Julio Reynafarje Reyna & Dr Gustavo Watanabe Oshiro, Peru

Fig. 1_Initial situation: severely stained tooth #11.
Fig. 2_A close-up of the upper anterior teeth shows that the aesthetic appearance is poor.
Fig. 3_Situation after minimally invasive preparation of the tooth.
Fig. 4_The adhesive was brushed onto the tooth structure for 10 seconds.

_How often do we encounter heavily stained anterior teeth in dental practice? Nearly every clinician has come across this problem at least once. In such cases, an invasive approach is usually required, i.e. the teeth need to be prosthetically restored with ceramic veneers or even crowns. However, since the concept of "minimal invasiveness" has attracted quite a following recently, it might be a good idea to start rethinking our ways of dealing with stained anterior teeth. Today's state-of-the-art composites enable dental professionals to use minimally invasive treatment protocols and achieve outstanding restorative results.

Training courses held on the subject of aesthetic dentistry usually focus on three basic aspects: shape, shade and surface texture. These are the three indispensable pillars without which the aesthetic restoration of anterior teeth would be impossible. However, in most cases attention is only paid to one of the aspects, namely shade. Why is this so? This article will show how all the three elements can be taken into account in order to achieve an aesthetic outcome.

_Preoperative situation

A female patient presented to our dental practice with a stained central incisor (Figs. 1 & 2). She refused to have the tooth prosthetically restored with ceramic material and expressed her desire to receive minimally invasive treatment. We decided to apply a direct restorative technique using a


Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5


Fig. 6


Fig. 7


Fig. 8

state-of-the-art composite resin (IPS Empress Direct, Ivoclar Vivadent).

_Initial steps and tooth preparation

As the degree of tooth discolouration varied from mild to medium, a preparation depth of 0.3 to 0.5 mm was sufficient. Following minimally invasive preparation, a retraction cord was placed to prevent contamination of the working field with sulcus fluid (Fig. 3). When fabricating layered restorations, the application of the adhesive is the step most prone to error. Therefore, it is advisable to use an adhesive system that is easy-to-use, but provides reliable adhesion.

In the case presented, we decided to use ExciTE F adhesive (Ivoclar Vivadent). After having conditioned the enamel with phosphoric acid gel (Total Etch, Ivoclar Vivadent) for 30 seconds, the adhesive was brushed onto the tooth structure for 10 seconds (Fig. 4) and blown to a thin layer with a weak stream of air. Subsequently, the adhesive layer was light-cured for 10 seconds with the bluephase curing light using the low power mode. Then, the first composite layer was placed. In order to achieve optimum masking, we chose to use the opaque B2 shade from the IPS Empress range of dentine materials.

_Layering

Mimicking the shape and shade of natural teeth is a huge challenge and requires considerable attention to detail. In order to achieve the same reflections as those of natural teeth, the dentine shade was applied in the form of an arch. As the composite material readily adapted to the preparation margins, only light pressure with the modelling spatula (Fig. 5) had to be applied.

The composite increment was deliberately moulded with a slight taper towards the centre of the tooth. In this way, an invisible transition to the subsequently placed increments was ensured (Fig. 6). Then, the composite was light-cured with the bluephase curing light for 15 seconds using the soft start mode.

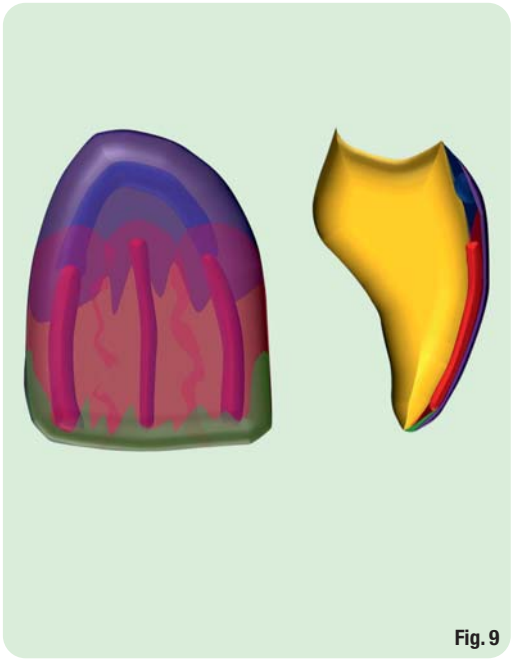
Fig. 9

Fig. 5_In the gingival portion, composite was applied in an arch shape to follow the gingival outline (B2 Dentin).
Fig. 6_The composite was adapted to the natural tooth structure.
Fig. 7_Placement of composite in the proximal portion of the tooth. An "arch" was moulded in this region too.
Fig. 8_The A1 Dentin shade was chosen for the central portion of the tooth (mamelon area). The incisal edge was covered with translucent opalescent material.

Fig. 9_Layering scheme showing the masking composite layers.


Fig. 10


Fig. 11


Fig. 12


Fig. 13

Fig. 10_Application of the enamel layer (B1 Enamel).
Fig. 11_Final polishing of the restoration with the Astropol system.
Figs. 12 & 13_The final result: aesthetic reconstruction of tooth #11 involving minimum loss of tooth structure.

After having moulded the gingival "arch", which outlined the gingival margin of the veneer, the proximal portions were moulded in a similar fashion. As each layer was thinned out, the different shades and shapes blended well into each other (Fig. 7). Once the mamelon-type increment had been placed in the centre, the discolouration was completely masked. The A1 Dentin shade was used in both the proximal and central areas.

To copy the appearance of the adjacent teeth, a translucent opalescent material was applied along the incisal edge. Finally, the entire composite build-up was covered with a layer of IPS Empress Direct B1 Enamel as indicated in the layering scheme (Figs. 8–10).

_Finishing

In order to reproduce the morphology and anatomy of natural teeth closely, just as much effort should be applied in finishing the restoration as in layering it. Following polymerisation, attention was paid to creating an optimal surface texture. First, the restoration was pre-contoured with fine-grit burs to remove possible composite excess. Fine-grit instruments provided the advantage of allowing an optimal shape to be achieved in a controlled fashion. Moreover, the inadvertent creation of undesirable retentions or depressions was avoided. After pre-contouring the restoration, finishing and polishing were performed using the Astropol system (Ivoclar Vivadent; Fig. 11).

_Conclusion

With state-of-the-art composites such as IPS Empress Direct, natural-looking restorations can be created. Easy-to-use materials in combination with individual layering schemes enable the employment of minimally invasive treatment procedures, even in cases in which indirect restorations would normally be indicated. By selecting a suitable restorative and following the treatment protocol described in this article, the three pillars of aesthetics can be taken into account in the restoration of anterior teeth (Figs. 12 & 13)._

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10:00 - 11:00 DR. HOWARD GLAZER // COURSE NO. 3780
GIOMERS: NEW GIANTS OF MI DENTISTRY

11:15 - 12:15 DR. SHAMSHUDIN KHERANI // COURSE NO. 3790
COMPREHENSIVE DENTISTRY USING DIGITAL IMPRESSION TECHNOLOGY

12:45 - 1:45 DR. RON KAMINER // COURSE NO. 3800
MINIMALLY INVASIVE DENTISTRY: TIPS AND TRICKS TO MAXIMIZE SUCCESS

2:00 - 3:00 DR. LOUIS MALCMACHER // COURSE NO. 3810
THE HOTTEST TOPICS IN DENTISTRY

3:15 - 4:15 DR. BRIAN NOVY // COURSE NO. 3820
TECHNOLOGY TO IMPROVE YOUR CARIES MANAGEMENT

4:30 - 5:30 DR. GEORGE FREEDMAN // COURSE NO. 3830
EVOLVING CONSERVATIVE RESTORATIONS

MONDAY, NOVEMBER 28

10:00 - 11:00 DR. FAY GOLDSTEP // COURSE NO. 4670
WHAT PATIENTS WANT... WHAT DENTISTS WANT: EASY, HEALTHY DENTISTRY!

11:15 - 12:15 DR. DAMIEN MULVANY // COURSE NO. 4680
WHY VIEW YOUR 3D PATIENTS WITH 2D IMAGES? A COMMON SENSE APPROACH TO 3D IMAGING IN THE GENERAL PRACTICE

12:45 - 1:45 DR. LARRY EMMOTT // COURSE NO. 4690
REMEMBER WHEN "E" WAS JUST A LETTER? USE E-SERVICES TO IMPROVE PATIENT CARE AND INCREASE PROFITABILITY

2:00 - 3:00 DR. GEORGE FREEDMAN AND DR. FAY GOLDSTEP // COURSE NO. 4700
DIODE LASERS AND RESTORATIVE DENTISTRY

3:15 - 4:15 DR. SHAMSHUDIN KHERANI // COURSE NO. 4710
LASER DENTISTRY OVERVIEW WITH AN UPDATE ON CLOSED FLAP OSSEOUS

4:30 - 5:30 DR. MARTY JABLOW // COURSE NO. 4720
UNDERSTANDING THE ADVANCES IN SELF-ADHESIVE TECHNLOGY AND HOW TO INCORPORATE THEM INTO YOUR RESTORATIVE PRACTICE

TUESDAY, NOVEMBER 29

10:00 - 11:00 DR. GREGORI KURTZMAN // COURSE NO. 5690
CORE BUILDUPS, POST & CORES AND UNDERSTANDING FERRUL

11:15 - 12:15 DR. PAUL GOODMAN // COURSE NO. 5700
CAPITALIZE ON THE HIDDEN IMPLANT PRODUCTION IN YOUR PRACTICE

12:45 - 1:45 DR. GEORGE FREEDMAN AND DR. FAY GOLDSTEP // COURSE NO. 5710
THE DIODE LASER: THE ESSENTIAL SOFT TISSUE HANDPIECE

2:00 - 3:00 DR. SELMA CAMARGO // COURSE NO. 5720
LASERS IN ENDODONTICS: CLINICAL APPLICATION FOCUS ON DIFFICULT CASES

3:15 - 4:15 DR. STANLEY MALAMED AND DR. MIC FALKEL // COURSE NO. 5730
LOCAL ANESTHETIC PERFORMANCE; FICTION, FACT AND ADVANCEMENTS (PRECISION BUFFERING)

4:30 - 5:30 DR. ENRICO DIVITO // COURSE NO. 5730
MINIMALLY INVASIVE ENDODONTICS USING PHOTON INDUCED PHOTOACUSTIC STREAMING (PIPS)

WEDNESDAY, NOVEMBER 30

10:00 - 11:00 DR. IRA LAMSTER // COURSE NO. 6600
MANAGEMENT OF THE PATIENT WITH DIABETES MELLITUS: CONSIDERATIONS FOR DENTAL PRACTICE

11:15 - 12:15 DR. GEORGE FREEDMAN AND DR. MARC GOTTLIEB // COURSE NO. 6610
ABC'S OF BONDING CERAMIC CROWNS AND CERAMIC REPAIR

12:30 - 5:00 **THE 2ND ANNUAL OSSEO UNIVERSITY SUMMIT: IN COMBINATION WITH THE LASER DENTISTRY SUMMIT** // COURSE NO. 6620

12:45 - 1:45 DR. RON KAMINER AND DR. ARMIN NEDJAT
MINIMALLY INVASIVE IMPLANT DENTISTRY FOR THE GENERAL PRACTITIONER

1:50 - 2:50 DR. DAVID HOEXTER
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Amaris—
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_Beauty, that everyone can see—with Amaris from VOCO, highly aesthetic restorations can be achieved in both the anterior and posterior areas. Thanks to convenient handling and simple shade selection, an endless number of shapes, shades and surfaces can be fashioned quickly with this novel composite system. The material flawlessly matches the tooth substance with its brilliance, natural opacity and coordinated chroma so that even the highest aesthetic demands are satisfied.

Amaris provides extraordinary natural and aesthetic composite restorations, especially in the sensitive anterior range, in a two-layer technique using only one opaque and one translucent shade per restoration. Corrections can be made up until the application of the last layer without having to remove the previously applied layer of base shade.

The Amaris shades conform to the natural shades of teeth instead of an industry standard. The entire spectrum of tooth shades is uniformly covered with the five opaque and three translucent shades included in the set, which saves space as yet another advantage.

Amaris not only simplifies systematic shade selection, but also satisfies individual requirements concerning transparency, luminance level and opacity. The core is constructed by applying an opaque shade. A finishing layer is modelled with a translucent shade, which simultaneously refines the colour scheme of the restoration. The Amaris system includes two effect shades, HT (High Translucent) and HO (High Opaque), for special accentuations, which can be used to create individual structures. HT is ideal for designing incisal edges and HO is suitable for masking discolouration, for example.

Amaris facilitates long-lasting, stable and abrasion-resistant restorations with its 80 % w/w filler content. The composite exhibits minimal shrinkage and can be modelled easily and finished without sticking to the instrument. An ingenious material composition provides for an especially simple polish and durable radiance.

VOCO is also offering the Amaris starter set in the user-friendly Caps version. The starter set consists of four Caps per shade (Opaque 1–5, Translucent Light, Translucent Neutral and Translucent Dark). Two syringes of Amaris Flow in the individual shades HT and HO complete the set._

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_The precision bond system

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In the eight-year clinical study published in 2010 by the renowned Katholieke Universiteit Leuven, Belgium, CLEARFIL SE BOND demonstrated its excellent clinical effectiveness with and without selective acid etching of enamel (97 % retention rate in both procedures!). Thus, CLEARFIL SE BOND is considered the gold standard by several universities and opinion leaders.

_Benefits

Benefits of the CLEARFIL SE BOND system include powerful hydrolysis resistance, mild etching, low technical sensitivity, excellent long-term marginal seal, high stability and durability over time, minor risk of secondary caries, least post-operative sensitivities, superb bond strength owing to chemical bond of adhesive monomer MDP to remaining hydroxylapatite crystals around the collagen fibre network, high error tolerance as well as no rinsing step and thus no over-wetting and -drying of exposed collagen._

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Kohler Matrix forceps with tungsten carbide coating


Fig. 1


Fig. 2

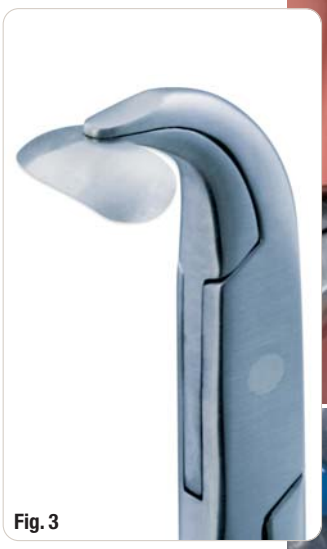
Fig. 3

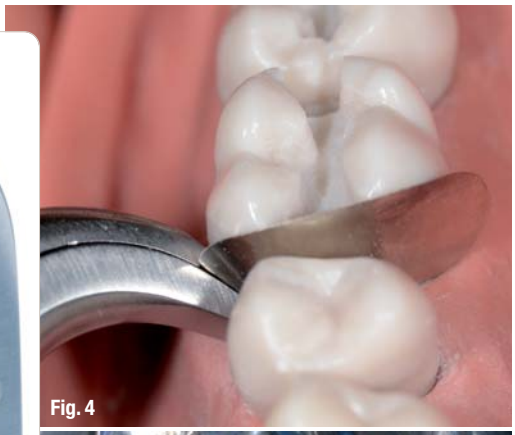
Fig. 4


Fig. 5

_Occlusal-proximal restorations in the posterior region are fabricated frequently using preformed sectional metal matrices. These matrices are curved and very thin to facilitate reconstruction of the anatomical tooth shape. A matrix retainer is not required for these matrices. However, they are sensitive, sometimes difficult to insert and even more difficult to remove if they adhere to the composite of the restoration.

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_sufficiently thin beaks to enable insertion into the occlusal and proximal space;
_perfectly designed to allow for effective clamping;
_rigid working tips with maximum grip to ensure reliable clamping, so that a matrix adhering to the composite material of the restoration can be removed quickly;
_resistant and sterilisable for daily use; and
in the open position, one working tip can be precisely positioned, while the other tip can easily be moved into position for gripping.

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DENTAL TRIBUNE

The World's Dental Newspaper

German dentist launches programme to help domestic violence survivors

Author_Yvonne Bachmann, Germany

Photo: Vasilchenko Nikita

_Victims of domestic violence often suffer both physical and psychological consequences. While some physical wounds gradually heal by themselves, others need professional care. German dentist Dr Jürgen Wahlmann has brought an American project to Germany that offers free dental restoration to men and women survivors of domestic violence.

Founded in 1999, Give Back a Smile (GBAS), the American Academy of Cosmetic Dentistry (AACD) Charitable Foundation's premier programme, makes it possible to restore the smiles of those who have survived domestic violence and have sustained injuries to the smile zone. With the help of volunteer dentists and generous donors, the programme has helped more than 1,100 survivors to date—a total financial value of more than US$10 million.

Dr Jürgen Wahlmann, President of the German Society of Cosmetic Dentistry, was inspired to

bring the GBAS programme to Germany after hearing the story of Mona, a domestic violence survivor who sustained injuries to her mouth after being shot at close range by her former partner. Mona spoke at the AACD's Annual Scientific Session in Honolulu, Hawaii, and told attendees how GBAS restored her smile—and helped to change her life.

Wahlmann was so stirred and impressed by Mona's account of courage that he spoke to his fellow board members of the German Society of Cosmetic Dentistry, who agreed to start the GBAS programme in Germany. After the AACD had given its approval, Wahlmann presented the programme to the society's annual meeting. "The response was overwhelming. We hope to make GBAS in Germany as successful as it is in the US. So far, around 20 dentists have shown interest in joining the programme. I would be happy if ten dentists signed up at first," he told cosmetic **dentistry**.

According to Wahlmann, funding should not be a problem. "All participating dentists will work for free. Also, the majority of laboratories have agreed to work without payment. Some dental manufacturers, such as General Implants and Friadent, provide their products for free," he said.

Additionally, fundraising events, such as Bleaching Day, which was held in September, help raise money for the project. On Bleaching Day, dentists all over Germany whitened patients' teeth and donated the proceeds towards GBAS. The bleaching materials required were provided free by American Dental Systems, BriteSmile, Ultradent and other companies.

Both the feedback from dental experts and from those affected has been very positive. "I have an agreement with the domestic violence shelter in Oldenburg. At first, people there were surprised about the project," Wahlmann stated. He added that his GBAS colleague, Prof Martin Jörgens from Düsseldorf, has also received positive feedback.

The treatment of domestic violence victims is often rather complicated. Almost all have experienced trauma and misery over several years and have horrifying stories to tell. Owing to this, they are often unreliable when it comes to keeping appointments. As treatment in most cases entails treatment in stages by a team of specialists, this is a problem.

"Usually, the complete treatment takes six months. Only patients whose teeth have been


Photo: Yuri Arcurs

damaged through domestic violence can be treated within the scope of GBAS. Dentists can easily tell if this is the case. Seventy per cent of all female victims of domestic violence have experienced trauma to the head," Wahlmann told cosmetic **dentistry**. "Another prerequisite for treatment is that the patient has been out of the abusive relationship for at least one year. Statistics show that the risk of a return to this kind of relationship is very high during the first year of separation."

While treating GBAS patients will not be easy, Wahlmann and his colleagues are dedicated to the project. In addition to Mona's story, the touching statement of another US woman contributed to his decision to bring the project to Germany. "After her treatment this woman said that, if she looks into the mirror she does not see the past but the future," Wahlmann said. "Those of us who are fortunate not to have experienced such sorrow should give back some of our fortune in some way."

For more information about the project, please contact Dr Jürgen Wahlmann on +49 4405 4050 or at givebackasmile@drwahlmann.de._

Wow, what a meeting!

Author_Dr Philip Lewis, UK

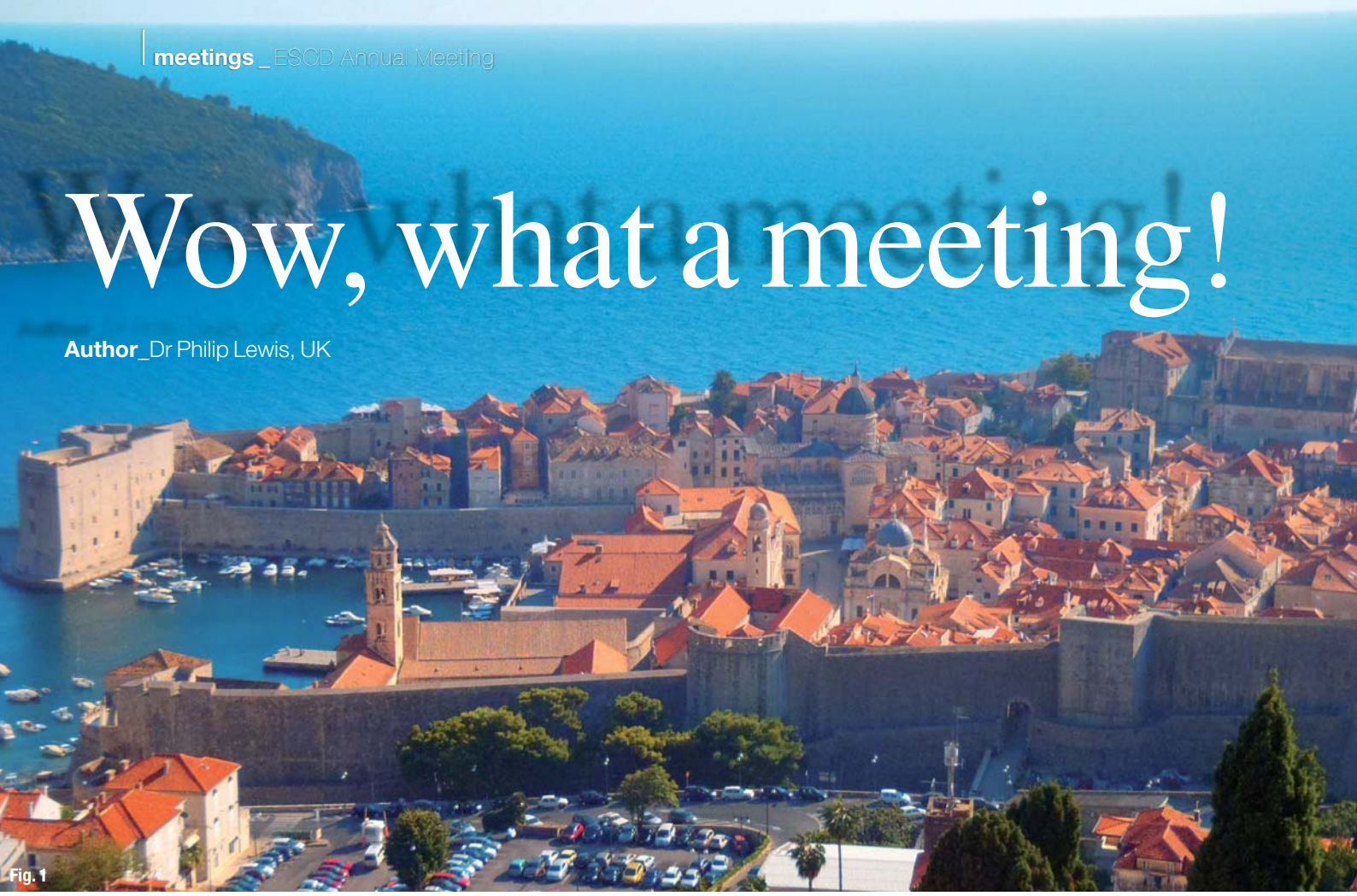

Fig. 1

Fig. 1_Dubrovnik, Croatia.
Fig. 2_Dr Hrvoje Pezo, President of the Croatian Dental Chamber, and Dr Wolfgang Richter, President of the ESCD.
Fig. 3_From left to right: Dr Gregory Brambilla (General Secretary and Certified ESCD Member), Dr Florin Lăzărescu (Country Chairman ESCD Romania), Dr Wolfgang Richter (ESCD President), Dr Daniel Baketić (Country Chairman ESCD Croatia) and Igor Ristić (Country Chairman ESCD Serbia).

_I brought my receptionist and my dental nurse with me to the eighth annual meeting of the European Society of Cosmetic Dentistry (ESCD), which was held from 30 September to 1 October 2011 in Dubrovnik, Croatia. Experience has taught me how important it is to bring team members to meetings so that they gain the same enthusiasm as the dentists and co-operate fully when new ideas from the meeting are introduced into the practice.

The meeting was presented jointly with the Croatian Dental Chamber and opened with a warm welcome from the organisers. The outstanding scientific programme included state-of-the-art lectures, workshops and live demonstrations!

Prof Nasser Barghi from the US is a well-known master of cosmetic dentistry. His lecture concentrated on the reliable and correct use of porcelain, from preparation to cementation. He compared various porcelains, pointing out their advantages and limitations, and shared numerous tips to help general practitioners produce the very best results with this material.

Fig. 2

Fig. 3

The extended uses of porcelain were explored further by Dr Davor Seifert from Croatia, who explained how in selected cases porcelain can replace composite in minimally invasive dentistry, providing a better cosmetic and more durable result, in his view. His lecture was illustrated with examples of addition veneers and Class VI restorations skilfully crafted from thin sections of the material with impressive results.

Dr Bob Khanna from the UK looked at the place of facial aesthetic treatments using botulinum toxin and dermal fillers as part of comprehensive cosmetic care. He described therapeutic treatments like treatment of the gummy smile and masseteric hyperplasia. He stressed the importance of a thorough knowledge of anatomy when carrying out these treatments and left delegates with an appreciation of how everybody's wish to look their best can be satisfied by combined treatments.

Dr James Goolnik from the UK discussed Internet marketing. While we may all be familiar with Facebook and LinkedIn, dentists need to recognise the opportunities for promoting their practices using these new technologies. Smartphones and YouTube also allow us to promote our message in ways not even available a few years ago and Goolnik explained how to get the most out of these possibilities.

Friday's session ended with Prof Gerwin Arnetzl from Austria speaking on CAD/CAM and illustrating his lecture with a live demonstration.

Saturday's programme was equally varied and opened with a live video link showing the placement of four implants in the edentulous jaw with immediate loading. Presented by Prof Pavel Kobler and Dubravko Jurisic from Croatia, the demonstration fascinated both those clinicians already placing implants and those who plan to do so.

Periodontist Dr Alain Romanos from Lebanon spoke on the prevention and treatment of recession in the aesthetic zone. Comparing the use of the AlloDerm implant (BioHorizons) to the more traditional connective tissue graft, he explained case selection, advantages, limitations, techniques and the range of uses of this microsurgical technique.

Dr Marco Martignoni from Italy looked at the restoration of the endodontically treated tooth. Stressing the importance of excellent endodontics as a starting point he went on to consider the use of fibre posts and various types of cement.

Fig. 4

Fig. 5

Fig. 4_Dr Bob Khanna.
Fig. 5_Dr Tif Qureshi.

Dr James Russell and dental technician Luke Barnett carried on the theme of minimal intervention using ceramics, and Profs Martin Jörgens and Marcel Wainwright from Düsseldorf looked at the latest in modern cosmetic dentistry from the use of lasers to ultrasonic surgery.

Drs Tif Qureshi and Lennart Jabobsen from the UK gave a two-part presentation on the concept of ABB—alignment, bleaching, bonding. With the use of the innovative Inman Aligner, the lecturers explained how simple, rapid tooth movement can be achieved in the aesthetic zone, allowing further treatment to be truly minimally invasive. Bleaching the teeth towards the end of alignment improves patient motivation. Any remaining edge defects or enamel problems can be corrected by bonding with the use of composite resin.


Fig. 6

Fig. 6_Prof Nasser Barghi (centre) is honoured by ESCD President Dr Wolfgang Richter (right) and Vice-President Dr Luca Dalloca (left).


Fig. 7


Fig. 8

Fig. 7_The President's Dinner party.
Fig. 8_Outside the lecture halls, there was much to enjoy.

Photographs courtesy of Magda Wojtkiewicz, Poland, and Dr Philip Lewis, UK.

As an alternative to the afternoon lectures, delegates had the opportunity to attend workshops, at which Dr Romanos expanded on in his lecture on recession, Prof Barghi showed clinicians how to produce impressive composite veneers with a simple technique and Dr Khanna gave a live demonstration on the use of dermal fillers.

Other highlights of the scientific meeting included the judging of the poster session, where once again very high standards were achieved, and the presentation of certification to an ESCD member, who had successfully submitted case reports and passed the oral examination required by the society.

Throughout the meeting, delegates could visit the excellent trade exhibition in the foyers, where a variety of products and services for the modern cosmetic practice were available.

All work and no play? Certainly not! ESCD meetings are well known for their social events and this year was no exception. From the ESCD and Friends' Party to the President's Party in a leading Dubrovnik restaurant, delegates had plenty of time to enjoy themselves to the full—with the more energetic partying on until late into the night!

How much do members enjoy these meetings? Well, to give you an idea, one member from France broke away from his honeymoon to bring his beautiful new wife to the event!

ESCD meetings really are very good indeed. The standard of education is excellent, with world-class lecturers regularly presenting. There is time to meet up with old friends and make many new ones. The discussions that go on outside the lecture halls can be as valuable as the lectures themselves as delegates from around the world share ideas that improve their practices. ESCD meetings are also very good value. The society tries to keep rates to a minimum to encourage all practitioners with a love of this area of dentistry to attend. Everyone attending an ESCD meeting for the first time typically can't wait for the next one!

The next meeting really will be special! To be held in the Romanian capital Bucharest from 17 to 19 May 2012, the scientific meeting will be the best value yet. Why? Because it is FREE! Thanks to the cooperation of the ESCD and the Romanian SSER, funds were raised from the EU and there will be no charge for the three-day tuition. Delegates will pay only for travel, accommodation, food and the social events. This offer is only open to ESCD members, so if you would like to benefit from it, join the society now by visiting www.escdonline.eu. The annual membership fee of only €190 for dentists and less for team members is very affordable. The offer of the free meeting is strictly limited so you must act quickly if you want to attend.

Personally, I can't wait and hope to see you there!_

_contact

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ADF
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Paris, France
www.adf.asso.fr

Greater New York Dental Meeting
25–30 November 2011
New York, NY, USA
www.gnydm.org

2012

SCANDEFA
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Copenhagen, Denmark
www.scandefa.dk

AACD Scientific Session
2–5 May 2012
Washington, DC, USA
www.aacd.com

ESCD Annual Meeting
17–19 May 2012
Bucharest, Romania
www.escd.info

EAED Spring Meeting
24–26 May 2012
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www.eaed.org

IACA
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www.theiaca.com

AAED Annual Meeting
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