





Contents

1.	TEAMPLAY with Initial LiSi By Tom Clauwaert and Bob Elst, Belgium	3
2.	Luting of an aesthetic restoration with a light-cure cement, G-CEM Veneer By Jacopo Mattiussi, Italy	10
3.	A simple, quick method for beautiful customised provisionals By Dr. Christian Lampson, Germany	15
4.	Preserving the posterior functional dentition By David Gerdolle, Switzerland	18
5.	Full arch rehabilitation with lithium disilicate secondary crowns luted on the primary framework By Joaquín García Arranz (Quini), Ramón Asensio Acevedo and Oscar Jimenez Rodriguez, Spain	22
6.	Implant supported hybrid restoration with thimble crowns By Bill Marais, South Africa	32
7.	Essentia Academic Excellence Contest: winning case By Myriam Alonso Fuente, Spain	37
8.	Managing congenitally missing lateral incisors with implants The key factors to reach an excellent result By Dr. Miguel A Iglesia Puig, Spain	42



Dear readers Welcome to the 12th edition of GC's Get Connected newsletter.

On the verge of IDS 2019, we look forward to sharing our latest innovations with you. In this edition of GC Get Connected, you will find a selection of clinical case reports with some of the latest additions to our product portfolio.

Initial LiSi Press, redefined lithium disilicate based on GC's proprietary HDM technology, is specifically highlighted in this issue. During IDS 2017 GC was confronted with allegations of patent infringement. We are very happy today, that shortly before IDS 2019 these allegations have been dismissed by the US International Trade Commission (ITC) as to be unfounded. This is good news for patients, dental practitioners and dental technicians alike that GC may continue to provide Initial LiSi Press ceramic for the inlay, onlay and crown & bridge technique. We intend to continue offering new, innovative and advanced developed materials and technologies in future, always meeting our customers' demands and expectations.

Enjoy reading this issue as well as your daily work.

Josef Richter President, GC Europe N.V.





Dentist Tom Clauwaert graduated in 2000 at the Vrije Universiteit Brussel (VUB) in



Bob Bosman Elst graduated in 1991 as a dental technician. While working at his own independent dental lab in Belgium, he has participated in more than 40 master-courses won the '3rd Prize worldwide' (in the category Nobel Biocare in Las Vegas. He came in as the 1st European of all participants of this highly reputable event. He set up a helpdesk 2017, he became a trainer of the GC Europe

TEAMPLAY with **Initial LiSi**

By Tom Clauwaert and Bob Elst, Belgium

A beautiful smile in harmony with a patient's facial features contributes to the self-esteem and general well-being of a patient. The final result should match the patient's expectations as closely as realistically possible. This step-bystep case report shows how a careful planning, material selection and clear communication to the patient can maximise your outcome and patient's satisfaction.

A 40-year-old female patient who was unhappy with the appearance of her maxillary frontal teeth presented at the dental office. Clinical examination revealed severe erosion of the maxillary anterior teeth with loss of vertical dimension, in a pattern strongly suggestive for erosion by gastric acid (Figure 1). The patient had suffered from bulimia nervosa in the past.



Fig. 1a: Patient's smile



Fig. 1b: Mouth in rest



Fig. 1c: Vertical reduction of the frontal teeth by severe erosion.

Aesthetic treatment plan

For the aesthetic treatment plan, a series of pictures was made. A diagnostic wax-up in harmony with the natural setting and taking into account the patient's wishes was created in the laboratory. This wax-up was then transferred to an intraoral mock-up (Figure 2). Both the images and the intraoral mock-up enhance the communication with the patient on a mutual level: The patient will comprehend what is realistically possible at the end of their treatment plan. Influences on function, such as the phonetics are also evaluated in this stadium. On the other hand, they can express the changes they wish to see in more detail. A careful treatment planning is the best guarantee to keep your patient satisfied in the long term.



Fig. 2: Intraoral mock-up. a) frontal view; b) lateral view

Shade determination (Figure 3)

The ingot LiSi MT B2 was chosen for the framework. However, I (Bob Elst, ed.) personally find the choice of the enamel ceramics of much more importance. The Initial Ceramic line offers a wide range of enamel shades. The CLF (Clear Fluorescence) shade, unique to Initial, is particularly interesting. With CLF, a true "dentine enamel junction" is created, which breaks the light in a dynamic way. It ushers the light into the restoration and enables the creation of a natural halo effect. To obtain a nice halo, the CLF has to come from incisally and the corner of the incisal edge should be trimmed in a 45° angle. The most difficult part in the shade determination process is to select the correct value. This is strongly linked with the manipulation of the enamel layers.



Fig. 3 a-c: Shade determination. It is important to keep the key in the same angulation as the tooth to have a similar light reflection. The shades are determined in daylight or lamps of similar intensity. The two enamel shades that most closely matched the teeth, were selected.





Fig. 5: Vestibular reduction



Fig. 6: Incisal view of vestibular reduction

Fig. 4: Incisal reduction

Teeth were prepared through the mock-up. A mock-up serves as an excellent indicator of the amount of tooth tissue that needs to be removed in each area to obtain the correct restoration thickness. Orientation grooves were prepared to guide the depth (Figure 4-7). The margins were placed equigingivally in order not to violate the biological width and unsupported enamel was removed (Figure 8).



Fig. 7: Lateral view showing the emergence profile and the equigingival margin



Fig. 8: Placement of retraction cords. Note that all margins were placed equigingivally.

With the LiSi system, a very natural emergence profile and a perfect transition from the gingiva to the crown can be obtained while respecting the biological width. The use of porcelainfused-to-metal and even zirconia frameworks often create a shadow zone at the gingival margin, right below the cervical margin of the tooth due to a lack of fluorescence of that part. The Initial LiSi Press framework distributes the light in a more natural way. Due to the HDM technology, the microcrystals are very evenly dispersed in the LiSi Press ingots and this effect remains after pressing. In the past, a dentist would have had the tendency to make the preparation deeper to avoid this

shadow at the edge, with the risk of damaging the biological width and gingival retraction after restoration placement.

Temporary PMMA veneers were created with the same putty index as the



Fig. 9: a) Silicone putty index; b) Transfer to the mouth

mock-up. The index was carefully trimmed following the gingival line (Figure 9a), so that the excess of the material could be removed easily after the transfer. After setting of the PMMA, the index could be easily removed (Figure 9b).



TEAMPLAY with Initial LiSi

After removal of the retraction cords (Figure 10), the PMMA was finished where necessary (Fig finishing) and polished with diamond paste until a high gloss was obtained.



Fig. 10: Removal of retraction cords



Fig. 11: Finishing and polishing of the temporary restoration.

Pressing

For a small laboratory, the processing and pressing of Initial LiSi Press in combination with LiSi PressVest investment is a huge advantage. With the correct processing, there is no, or virtually no reaction layer, which benefits the fit for sure (Figure 12). We only have one pressing furnace, so the extended time to place the cylinder in the burning furnace, between 20 and 180 minutes, helps to maintain a smooth serial workflow. We put the cylinder from the burning in the pressing furnace after maximum one hour. The press temperature is different for each furnace because there is always a small deviation. We did our calibration firing with CLF. This has to be completely transparent after firing and still show sharp edges. We also did some sample pressings with wax profiles. After pressing, the cutback was optimised. We chose for a simple cutback because additional adjustments could still be made during the build-up of the ceramic (Figure 13).



Fig. 12: Divesting of the restorations. There is virtually no reaction layer.

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Fig. 14: Initial Lustre Pastes were chosen for the connection between the cutback ingot and the veneering ceramic. Alternatively, Initial LiSi powders can be used.

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Fig. 13: Cutback with gold powder showing the surface texture



Fig. 15: CLF powder was sprinkled on top before the first firing.

Firing

After the preparation of the cutback with diamond burs, the structure was gently sandblasted with 25-50 μ m Al₂O₃ at a maximum pressure of 1.5 bar.

In this case, the wash fire (first firing) was done with Initial Lustre Pastes (Figure 14). In this case, I preferred to use Lustre Pastes rather than LiSi powders because of the particular build-up of the natural tooth colour. With Lustre Paste, it was easier to visualise the intensity of the colours. CLF was then sprinkled over the Lustre Pastes (Figure 15).



Fig. 16: Result after the wash fire.

Starting from the wash fire (Figure 16), the mamelons will be adapted so that the horizontal line is visually broken and more depth can be added to the incisal zone.

After the wash fire, the incisal zone is created. The most important part is to break the vertical and horizontal lines. The natural pattern within the tooth does not consist of straight lines either, so a more wavy pattern, or S-lines will create a much more natural effect. By using mixtures of different shades, playing with the horizontal line and varying the thicknesses of the build-up, a 3D effect can be obtained that effectively mimics the natural inner texture (Figure 17). After creation of the mamelons, they were again covered with CLF (Figure 18); hence, the mamelons were 'wrapped' entirely with CLF and as such they were naturally accentuated within the structure. It optimises the light transmission, creating the desired halo effect as mentioned before This was followed by a firing cycle to which I like to refer as the 'chroma fire'.

Due to the stability of the LiSi ceramics, multiple firings can be done; however, colour is mostly determined by the build-up of the chroma fire. The temperature of the chroma fire was 20°C lower than the wash fire. I avoid having to make adjustments to the chroma after the shape fire because it will be harder to control the value. Hence, we do our first colour check after the chroma fire (Figure 19).

Thereafter, build-up continued with the enamels. A mixture of El 14 and El 11 was used for the main enamel portion. This same mixture was added to the dentine for the build-up of the mamelon structure in the previous step (chroma fire).





Fig. 17: Creation of the incisal zone with the mamelon structure. Green: enamel mixed with Dentine A2 50%; Yellow: FD 91 met CLF 50% (this softens the FD and makes it less prominent); Pink: pure Dentine A2. Mamelons were also already created with the cutback of the MT B2 ingot. a) vestibular view; b) incisal view.



Fig. 18: The mamelons are covered with CLF powder. This wrapping of the enamel with CLF ensures an optimal light transmission and creates a natural halo effect.



Fig. 19: After the chroma fire

Natural teeth show an opalescence effect; this can be best explained as an iridescent effect with a changing balance between white, blue and orange, depending on the angle and reflection of the incident light. To mimic this effect, 20% of Opal Booster was added to the enamel and a small portion of pure Opal Booster at the enamel rim (Figure blue/green) and the restorations were fired for the last time (Figure 20). For this shape fire, the same settings were used as the chroma fire.

Next, the contact points were optimised. Because a die model always has some minor deviations, the contact points should always be verified on the master model.

After the shape fire, there is still an opportunity to optimise the shape in a correction fire; if a correction fire would be chosen, the temperature is lowered with 3 degrees. It would be too much to lower with 10 degrees because a low-fusing porcelain was used.

Once the desired shape was obtained, we proceeded to the detailed finishing and surface texture was checked with gold powder (Figure 21). For this patient, a subtle texture sufficed (Figure 22).

After removal of the temporary veneers, the teeth were cleaned with polishing paste. The intaglio surface of the restoration was etched with hydrofluoric acid gel under microscope magnification. After rinsing, the restorations were primed and air-dried. In the mouth, the lateral incisors were isolated with Teflon and



Fig. 20: Build-up of the enamel layers. Blue: enamel mixed with 20% of Opal Booster; Green: pure Opal Booster.





Fig. 21 a-b-c: The surface texture accentuated with gold powder.



Fig. 22: Restorations after the shape fire on the master model.

TEAMPLAY with Initial LiSi



Fig. 23: Seating of the central incisors.



Fig. 24: Tack-curing the luting composite resin for easy excess removal

both central incisors were cemented using a dual-cure resin cement, shade A2 (Figure 23). After placement, the cement was tack-cured for 2-5 seconds and excess of cement was removed. After light-curing (Figure 24) they were left to chemically cure for 2-4 minutes. That procedure was repeated for the lateral incisors and the canines. Remnants of excessive cement was removed under high magnification with a scalpel for all the restorations. The occlusion was checked and small corrections in lateral movements were done with a diamond bur and polished to high gloss.







Fig. 25 – 28: Final result, looking very natural and matching the patient's features.



The patient was very happy with the aesthetics of her teeth and she felt she could smile with confidence again (Figures 25-28). Careful planning and good communication between patient, dentist and dental technician are key in obtaining a satisfactory result.



Dr. Jacopo Mattiussi graduated in Dentistry and Dental Prosthetics with honours at the University of Genoa in 2013. Currently, he is working in several dental practices in the conservative, prosthetic and endodontic field with a particular passion and attention for aesthetic and adhesive dentistry. He is a member of the Italian Conservatory Academy (AIC) and the Italian Society of Endontics (SIE). In 2018, he won the prize of the SIE in the category 'Under 32'. He actively participates to various national and international courses and lectures for GC Italy.

Luting of an aesthetic restoration with a light-cure cement, G-CEM Veneer

By Jacopo Mattiussi, Italy

The aesthetic treatment of a single anterior tooth is often a challenge. Many cases can be improved, sometimes solved by bleaching. If the colour is not sufficiently corrected or additional changes to shape or texture are required, a restoration becomes necessary. This is why feldspathic veneers are becoming increasingly popular. However, they remain a delicate treatment option because of their limited thickness and high translucency. Achieving a good colour match is therefore also influenced by the colour of the substrate and the used cement.

A 47-year-old, female patient was referred to our dental office by a colleague. She was bothered by the aesthetic appearance of her maxillary frontal teeth (Figure 1) and she wanted to have it restored.

The patient reported a trauma on element 11 about ten years before during a domestic incident and increased darkening of this element over the years.

Intraoral clinical examination revealed a good oral hygiene, absence of caries and good periodontal conditions. Tooth 11 was severely discoloured (Figure 2), most probably due to the trauma that had occurred in the past. The soft tissues around the element

were well preserved and the tooth shape was intact.

There was no tenderness to percussion and no apical lesions were seen on the radiographic image. Tooth 11 did not respond to the vitality test. Therefore, the patient was first referred to a colleague for endodontic treatment.

After the tooth had been endodontically treated, the following therapies were explained to the patient: In ascending order of invasiveness: 1) Non-vital "walking bleach" technique (First choice) 2) Non-vital "walking bleach" technique + veneer (Second choice) 3) Veneer (Third choice)

The patient opted out of internal bleaching because of her husband's bad experience with bleaching done by his previous dentist some years before. After having explained the increasing invasiveness and need for tooth tissue removal in absence of prior tooth bleaching, it was chosen to treat the case with a feldspathic veneer.

A 3-0 retraction cord was inserted into the gingival sulcus in a very delicate manner without administering anaesthesia.

The tooth was isolated with a split dam to obtain a discrete isolation, while maintaining a good brightness of the field, a visual control of the soft tissues and without unnecessarily stressing the gingival tissues, at least during the preparation phase (Figure 3).

Since no alterations in tooth shape were needed, no mock-up was





Figure 1-2: Initial situation. Tooth 11 is severely discoloured.

prepared. Vestibular and incisal depth orientation grooves were prepared with calibrated burs (Figure 4), following the three sagittal inclination planes of the incisor (cervical, central and incisal) and the cervical zenith placed slightly to distal. The depth of vestibular grooves was 1 mm to have sufficient space to mask the discolouration. The incisal reduction was 1.5 mm.

The cervical and interproximal finish line were prepared in a chamfer. Incisally, the internal line angles were rounded to avoid stresses and finished in a sharp lingual butt-joint (Figure 5-6).



Figure 3: The field was isolated using a split dam technique.



Figure 4: Depth orientation grooves.





Figure 5-6: After sufficient reduction, internal angles were rounded and the entire preparation was finished with a hatchet.



Figure 7: Immediate dentin sealing with G-Premio BOND.



Figure 8: Final polymerisation after application of GC GRADIA air barrier.



Figure 9: Impression showing the preparation in detail.

Before the impression was taken, the exposed dentin was treated (immediate dentin sealing, IDS) with the self-adhesive system G-Premio BOND. GC GRADIA air barrier was applied before the final polymerisation (Figure 7-8). After having taken the impression (Figure 9), an acrylic provisional restoration was made using a silicone key, and cemented with a drop of flowable resin cement after the finishing and polishing. The impression was sent to the dental laboratory of Donato D'urso for the manufacturing of the feldspathic veneer (Creation veneering ceramics, Creation Willi Geller). In the next session, the provisional

restoration was removed. The tooth surface was slightly smoothed with a scaler and polished with pumice to remove impurities. The colour was verified without rubber dam and with the tooth still hydrated using the dedicated try-in pastes (G-CEM Veneer Try-in Paste; shades Transparent and A2). A light-cured aesthetic resin cement in shade A2 (G-CEM Veneer) was selected for the cementation. Light-cured resin cements are suitable for aesthetic cases because of their excellent colour stability and because the limited thickness of the veneer enables proper light-curing. This cement in particular is easy to use due to its thixotropic properties and the long working time.

The tooth was isolated with a rubber dam and clamps with a low retraction hook so the clamp could be seated without laceration of the gingival tissue (Figure 10). The dentin was sandblasted (30 µm silicatised sand) to roughen the surface that was priorly hybridised by IDS (Figure 11).

Next, an etchant was applied for 30 s (Figure 12) to create microporosities in the enamel and to remove the impurities from sandblasting, leaving a clean surface (Figure 13).



Figure 10: Isolation with rubber dam prior to cementation.



Figure 11: Sandblasting the tooth surface.



Figure 12: Etching of the preparation.





Figure 13: Preparation surface after etching.

Figure 14: Application of G-Premio BOND.

G-Premio BOND was then applied to the entire tooth surface, left undisturbed for 10 s and air-dried with maximum air pressure during 5 s before lightpolymerisation (Figure 14). The feldspathic veneer was etched with hydrofluoric acid, rinsed and subsequently treated with phosphoric acid to remove residues and leave a clean surface after rinsing. The internal surface of the veneer was then silanated with G-Multi PRIMER (Figure 15).



Figure 15: a) Restoration before treatment



d) Application of phosphoric acid to clean the surface



b) Application of hydrofluoric acid



e) Rinsing off the phosphoric acid



c) Rinsing off the hydrofluoric acid



f) Application of G-Multi PRIMER

The cement was applied onto the internal surface of the veneer and the veneer was gently seated onto the tooth. Cement excesses were carefully removed with microbrushes. It was polymerised in a gentle way in small steps to avoid stress on the ceramic during the early stages of polymerisation of the resin composite cement (Figure 16). Glycerine gel was applied before the final polymerisation. The margins were carefully cleaned and smoothed by removing excesses with a scalpel blade (Figure 17) and Teflon tips mounted on a sonic handpiece in order not to damage the ceramic.

After one week, the patient came for a check-up. A good colour match was obtained (Figure 18-19) and the treatment matched the expectations of the patient.





Figure 16: Light-curing of G-CEM Veneer through the restoration.

Figure 17: Finishing the margins with a scalpel blade.



Figure 18: Final result, showing excellent colour match.



Figure 19: View of the smile one week after the treatment.



Dr. **Christian Lampson** obtained his dental degree in 2007 at the University of Heidelberg (Germany) and finished his doctorate in 2008. He is working in the Praxisklinik Dr. Dr. Thein und Kollegen in Karlsruhe since 2009. The focus of his activities is on aesthetic dentistry.

A simple, quick method for beautiful customised provisionals

By Dr. Christian Lampson, Germany

All too often, little importance is given to provisional restorations in the restoration process. This is unfortunate, since high-quality provisionals offer many benefits. Initially, it may seem that they will increase the treatment cost, but it prevents many aggrevations. It will also increase efficiency in the end, especially when more complex treatments are planned. A good provisional does not only protect the prepared teeth, but gives a preview of the definitive restoration and provides the patient with comfort, function and aesthetics while waiting for the definitive restorations.

Recent advances in technology have now enabled rapid creation of beautiful and reliable provisionals that can be polished to high gloss in a few simple steps, as can be seen in the following documented case.

A simple, easy method for beautiful customised provisionals



Figure 1: Patient with severely abraded teeth, in need of multiple restorations.



Mulio

Figure 2: The reduced vertical dimension needed to be restored. Because of the complexity of the treatment, a wax-up and mould were created in the lab after thorough treatment planning.

Figure 3: Teeth after preparation



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Figure 4: After tooth preparation, temporary bridges were made one by one with TEMPSMART DC, a dual-cure composite for temporary restorations.



Figure 5: After initial autopolymerisation, the mould with the temporary was taken out of the mouth and the restoration was light-cured for a fast setting and increased strength.





Figure 6 and 7: Excesses could be easily removed with a bur to create smooth margins. Due to the light-curing, the material reaches hardness very fast and it can be easily polished in a few steps.

A simple, easy method for beautiful customised provisionals



Figure 8, 9 and 10: The procedure was repeated for the other segments.



Figure 11: For the entire upper jaw, all temporaries were finished and polished in no more than 20 minutes.



Figure 13: Immediately after placement of all provisional restorations, the patient as well as the dentist get an impression of the final restoration outcome.

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The patient can be allowed sufficient time to get used to the increased vertical dimension and adjustments can easily be made if necessary. TEMPSMART DC can be adjusted or repaired very easily with a composite (e.g. G-ænial Universal Injectable), a bisacrylic resin (e.g. Unifast TRAD) or with TEMPSMART DC itself.

Instead of a necessary evil, the period of temporization

_____ Figure 14: Final treatment result after replacement of the temporary restorations.

allows the dentist as well as the patient sufficient time to evaluate the treatment plan. In this stage, adjustments can still be made and because the material is very strong and wear resistant, it can be used for a longer time. It's an assurance for both the patient and dentist and should therefore be considered as a crucial and integral part of the restorative process.





Dr. David Gerdolle obtained his diploma of dental surgeon at the Faculty of Dental Surgery, University of Nancy (France) in 1993. Since then he achieved Postgraduates in Orofacial and Osteoarticular Biology and Prosthodontics and Adhesive Dentistry. He was part of the teaching staff of the faculty of the University of Nancy between 1993 and 2005 and since 2006 he runs a private practice in Vevey-Montreux (Switzerland). His practice is dedicated to minimally invasive dentistry and adhesive techniques.

Dr. Gerdolle is involved in various postgraduate courses at the University of Paris (France) as well as in research programs on composite resins at the University of Nancy. He regularly gives presentations in various conferences and seminars, conducts practical work as well as live demonstrations on patients in the field of adhesive dentistry and indirect restorations in particular. He has published numerous articles in national and international journals on this subject.

Preserving the posterior functional dentition

By David Gerdolle, Switzerland

The choice of the restorative material, especially for indirect restorations, is always based on the requirements of the individual case. Factors such as aesthetics and required strength have to be considered, but other aspects, such as chewing forces and antagonist teeth should not be forgotten either. In the following case, the nature of the antagonist and the size of the restoration require a material with a low abrasive rate, yet strong. CERASMART™270 is a new hybrid ceramic with a refined structure, that makes it exceptionally strong and smooth, with less risk of wearing the antagonists.

A 66-year-old female patient came to the practice because she was concerned about tooth 37, which had a large restoration. She was afraid that the tooth might fracture because of the dentine pins with which the restoration was fixed. The patient still had her natural dentition in lower arch, but at the upper arch, she was wearing a full removable prosthesis with resin teeth. The old, large composite restoration and three parapulpal pins were removed from tooth 37. The tooth

18 GC get connected

Preserving the posterior functional dentition







Figure 2. Polarised image of the shade determination.

Figure 1. Tooth 37 after preparation.

was prepared in order to achieve a minimal thickness of 1.5 mm for all walls; the overall thickness was between 1.5 and 3 mm. All sharp internal angles were rounded (Figure 1). The shade was determined using a VITA colour scale; shade A3 was selected (Figure 2). The dentin was immediately sealed with a universal adhesive system (G-Premio BOND, GC), reinforced by a very thin layer of flowable composite (G-ænial Universal Injectable, GC). Then, a digital impression was made from the preparation and the antagonist teeth (Figure 3 and 4).

A temporary restoration was made from a temporary resin composite material (Revotek LC, GC), and placed onto the preparation to maintain the dimensions.



Figure 4. Fig. 4: Digital bite registration.



Figure 3. Preparation scan as seen from different angles.

A hybrid ceramic (CERASMART270, GC) was chosen as the material for the overlay. Especially in this case, a ceramic restoration would cause too much abrasion of the opposing denture teeth. On the other hand, CERASMART270 is very resistant to fracture and margins are sharp and precise. The overlay was digitally designed and milled from the hybrid ceramic block. Thereafter, it was coated and characterised with OPTIGLAZE color (Figure 5). The intaglio surface was sandblasted with 25-50 μ m Al₂O₃ at 0.15 MPa.





Preserving the posterior functional dentition

At the second appointment, the temporary restoration was removed, the rubber dam was immediately placed and the tooth was cleaned with glycine powder in order to remove the dental plaque. The preparation was sandblasted (27 μm Al₂O₃ at 0.2 MPa) and the enamel margin was etched using 35% phosphoric acid for 45 s. The CERASMART270 overlay was tried in and the margins, occlusion and proximal contact point were verified.

Thereafter, the adjacent tooth was protected with Teflon tape and Super

Floss (Oral B) was placed around the tooth to avoid any excess of luting cement to penetrate deeply between the rubber dam and the tooth. A thin layer of G-Premio BOND was then applied on the preparation. On the other hand, the intaglio surface of the crown was treated with a universal restoration primer (G-Multi PRIMER, GC; Figure 6), heated for 1 minute (air dryer), and then coated with a thin, unpolymerised adhesive layer.

The crown was luted with a conventional, preheated composite (Essentia, GC; Shade MD; Figure 8) and

seated with moderate pressure (Figure 9). A brush, impregnated with a very small amount of Modeling Liquid (GC) was used to smooth the margins while maintaining the pressure in order to avoid any finishing procedure (Figure 10). Thereafter, each surface of the restoration was lightcured. An overall energy of 300000 mJ/cm was applied, meaning about 5 minutes of polymerization with a 1000 mW/cm² powerful curing unit. Air cooling, followed by air/water cooling was done during the entire light-curing process to avoid any damage to the pulp. (Figure 11).



Figure 6. Restoration pretreatment.



Figure 7. Adhesive application to the tooth (G-Premio BOND).



Figure 8. Adhesive luting with composite (Essentia, shade MD).



Figure 9. Moderate pressure was applied. The use of light-curing composite allows a long working time and excess can be easily removed.



Figure 10. All excesses were carefully removed before light-curing while maintaining pressure.



Figure 11. Light-curing of the cemented restoration from each surface.

Preserving the posterior functional dentition

After light-curing, the margins and contact point were verified. The isolation was removed and occlusion was checked. A satisfying result was obtained with CERASMART270, showing excellent colour integration and a smooth and glossy surface.



Figure 12. Result right after cementation. The margins and contact point were verified.



Figure 13. Final result after having verified the occlusion.



Force absorbing hybrid ceramic CAD/CAM Block

OPTIGLAZE color Light-cured coating for indirect restorations





Joaquín García Arranz (Quini)

Founder of the dental laboratory Ortodentis, which has been developing its private labour since 1991.

Director of the Dental Training Center in Madrid by Quini.

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Full arch rehabilitation with lithium disilicate secondary crowns luted on the primary framework

By Joaquín García Arranz (Quini), Ramón Asensio Acevedo and Oscar Jimenez Rodriguez, Spain

Dealing with implant restoration is challenging, and this process would be impossible if we did not communicate freely between the clinic and laboratory.

At the start, we don't know what type of framework design we will have to make, nor what the pink and white proportions will be.

The starting point is that we work as a team, maintaining constant communication through emerging technologies in photography or digital smile design.

In a treatment protocol for complete edentulism with digital design information, we transfer the ratios of white and pink aesthetics to the scanner, turning it into an analogue test for a first analysis inside the mouth via CAM.

When we know how far we need to go with the case, we select the type of material that will result in the best outcome, mixing materials with different techniques throughout its development.

The patient's needs are always taken into account when searching for greater durability of our prostheses over time.

A patient with deprecated crown and bridgework attended the clinic because several abutment teeth had failed. Due to the Class III occlusal pattern and the small number of remaining teeth with a good, long-term prognosis, we decided to go for an implantsupported restoration in the maxilla and a combined tooth-implant restoration in the mandible.

Today, these technologies are a basic tool for treatment approach and development.

We combined Digital Smile Design (DSD) and the patient's photographs and we entered them into the GC Aadva Lab Scan's Exocad software. We merged the patient's facial contours with the Anteriores Templates Contour Library provided by Jan Hajtó. (Figure 1) Once the teeth matching the facial features were selected, we started to adjust the tooth shapes, keeping a close eye on length-to-width ratio, midline and labial and pupillary plane. When the white aesthetics were finished, we designed the pink aesthetics together with the implants; taking the anatomical design and the cleansable basal area into account (Figure 2). After the aesthetic design, we sent this digital information to the CAM software to



Figure 3: mock-up in PMMA with pink and white aesthetics





Figure 1 (a and b): Digital mock-up



Figure 2: Digital design of the gingiva

create a mock-up structure in PMMA. This can be done by either milling or printing (Figure 3).

To check the precision, we systematically link our aesthetic mock-up to the implants: we do this by screwing three implant interfaces to the implants with the correct occlusion, providing a tripod of accuracy.

With a constant, good communication between dentist and laboratory, we



Oscar Jimenez Rodriguez

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Scope, at the Murcia Prosthetic School, Dental Miv Facilities and Inside GC Iberica with Ceramica GC Initial. Speaker In The Modular Master In Dental Miv, 2017 And 2018.





Figure 4: Evaluating the integration of the mock-up in the patients mouth

did several aesthetic tests, working to a high degree of accuracy. In this phase we need to work precisely and consistently before we can continue with the treatment. All necessary changes were made to clear any doubts until we achieved the desired integration of the mock-up into the patients mouth and face. (Figure 4)

During the treatment protocol for edentulous patients, we take the time to evaluate the aesthetic



Figure 5: Choice of different definitive materials

mock-up verify what the best obtainable result would be and which material would be ideal for the final restoration: a conventional PFM restoration or a white material, such as zirconia, combined with metal interfaces. (Figure 5)

For this type of design, there are many elements we have to take into account: the length from the implant to the incisal edge, implant-restoration ratio, widths of the design, occlusion, etcetera.

We take great care ensuring every patient has a prosthesis customised to their needs. The restoration should be durable and, in case of an accident, easy to repair. Therefore, in some metal-ceramic as well as in zirconia restorations, we make single crown designs on a primary framework (Figures 6 and 7).

This enables us to repair or replace a broken element. In this case, where we had sufficient length, a change



Figures 6 and 7: Single crown design on different framework materials for easy repair

from a Class III to Class I occlusion with a considerable adaptation in the vestibular direction and long tooth structures in proportion to the gingiva, we opted for a PFM framework. We scanned the aesthetic mock-up with the GC Aadva Lab Scan and determined implant positions with its dedicated Scan Flags (Figure 8).

Thanks to the tilt and swivel unit, 90 degree angulation and dual camera system, we were able to scan the basal side of the mock-up. With the Exocad software we could make a quick design of the restoration with a proportioned reduction (Figure 9). Once the frame structure was designed, the .stl file was sent to the milling unit to mill the metal framework. Although our protocol was carried out with rigid splinting of the impression copings, we still tested the framework's passive fit , both on the model and in the mouth.

For layering, we have two different techniques , both with their advantages and disadvantages:

- Pink layering technique with white aesthetic cut back technique.
- Pink layering technique with white aesthetic full contour painting protocol. (as is also shown in the 'Alternative method' part)

Initial LiSi Press MT was used for the secondary crown frameworks. The cut-back technique was used in the anterior area and full contour frameworks were used in the posterior area.

For this technique, we use duplicated secondary crowns in milled PMMA or wax to fit the emergence profile



Figure 8: Scanning the aesthetic mock-up

correctly while layering the pink aesthetics with GC Initial MC. After layering the pink aesthetics, we applied a very fine layer of highly chromatic ceramic (GC Initial MC) onto the die's surface (Figure 10). Once fired, this gives us the big advantage of being able to create a chemical bond between this feldsparbased ceramic and the future lithium disilicate secondary single crowns



Figure 10: PFM framework: pink aesthetics with GC Initial MC.



Figure 9: Framework design in GC's Exocad software

(Initial LiSi Press) that can now still be re-adjusted before pressing them (Figure 11).

We use this technique mostly for anterior restorations, leaving the lingual side monolithic with the correct occlusion and without any protrusive risk of chipping the ceramic. GC Initial LiSi Press looks very much like natural teeth, enabling an excellent integration (Figure 12 a and b).



Figure 11: Single crown frameworks ready to be pressed







Figure 13: Light dynamics of natural teeth in direct and indirect light

The best way to understand how the light dynamics of a material works is to conduct different tests with a natural tooth and play around. Not only in direct light but also in indirect light (Figure 13) and even in black light or fluorescent light (Figure 14). By matching these optical properties we can achieve good aesthetic results. GC Initial LiSi Press is available in degrees of translucency, from the most opaque to the most translucent (MO, LT, MT and HT).

The anterior area is the most aesthetic demanding area and was veneered using the polychromatic layering technique using Initial LiSi veneering ceramics. This ceramic is exactly cross-matched to the lithium disilicate framework and ensures a perfect fusion (Figure 15). Once the macro



Figure 14: Light dynamics of natural teeth in fluorescent light

and microtexture surface have been finished, we mechanically polish it for a perfect integration with the pink aesthetics.

Cementation And Bonding Protocol

The bonding protocol to cement the LiSi Press restorations onto the surface of the ceramic covered dies starts by applying a hydrofluoric acid etch for 20 seconds on both ceramic surfaces. CERAMIC PRIMER II or G-Multi PRIMER is applied and dried (Figure 16).

Shade A2 of G-CEM Veneer was selected, verified with G-CEM Try-in Paste to check the shade and used to cement the restorations (Figure 17). The cement was tack-cured for 1 to 3 seconds to remove excess material and then completely light-cured for 30 seconds. After completion (Figures 18 and 19), the restoration was finished and polished.

The finished restoration, placed in the mouth (Figure 20 and 21) showed good integration. The correct implant seating was verified with CT scan (Figure 22). The basal adaptation was perfect to enable optimal cleaning of the mucosa. Occlusal fit was checked with active posterior cusps, and canine and protrusive guidance.





Figure 15: Layering with Initial LiSi

Figure 16: Etching and pretreatment of the ceramic surfaces



Figure 17: Cementation using G-CEM Veneer A2



Figure 18: Perfect integration of the pink and white parts after mechanical polishing



Figure 19: Finished restoration

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Figure 20: Intraoral view after treatment

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Figure 21: Frontal view after treatment

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Figure 22: Radiograph after treatment

Alternative Method

In this case, zirconia was used for the primary framework. Before sintering, the dies were infiltrated with colouring liquids and fluorescent effect.

The secondary, full anatomical crowns are adjusted to the zirconia framework. After pressing in LiSi Press MT, the surface structure (macro and microtexture) is engineered. (Figure A)

Here, the aesthetic details were painted on the full contour zirconia restorations, using the GC Initial Spectrum Stains and fixated in the ceramic furnace. A great advantage of this approach is the ability to continue firing until the desired colour is achieved. (Figure B)

Once the desired colour is achieved, the surface is mechanically polished. The inside of the LiSi Press crowns and the zirconium die surfaces are gently sandblasted with aluminium oxide. We pay close attention to the correct fit between the LiSi Press restorations and the zirconia framework. (Figure C)

The most delicate step in this technique is where we place highly fluid Initial LiSi ceramic on the dies' surface, manoeuvre the crowns into their right position and take the marginal fit and occlusion into consideration. (Figure D)

A special firing for overall fusion of the secondary LiSi Press crowns and the primary zirconia framework is conducted. Once both structures are fired together, we layer the pink

aesthetics with Initial Zr-FS. Multi chromatic layering during different firing cycles is performed to reach the desired goal and have a perfect gingival adaptation (Figure E).



Figure A: Micro and micro surface texture engineering



Figure C: Fitting the LiSi Press restoration onto the zirconia framework



Figure E: Multi chromatic layering of gingival structures





Figure F: Polished gingiva and teeth, view from two different angles

The mucogingival surface is finished and mechanically polished together with the crowns (Figure F), resulting in a nice integration.



Figure. B: Application of the Initial Spectrum Stains



Figure D: Highly fluid LiSi ceramic is applied onto the zirconia framework



REFERENCES

- 1. "Restauraciones de porcelana adherida en los dientes anteriores". Método Biomimético. Pascal Magne. Editorial Quintenssence SL. Barcelona 2004
- 2. "Implant Aesthetics" Luc & Patrick Rutten. Teamwork media GmBh 2001
- "Evolution" Contemporary Protocols for Anterior Single-Tooth Implants. Iñaki Gamborena & Markus B. Blatz. Quintessence Publishing Co Inc 3. 2015
- 4. "Anteriores Natural & Beautiful Teeth". Jan Hajtó. Teamwork media GmBh 2006
- 5. "Crown Bridge & Implants" The Art of Harmony. Luc y Patrick Rutten. Teamwork media GmBh 2006
- "Desafiando la Naturaleza". Paulo Kano. Quintenssence Editorial Itda. 2012
 "Motivation". Claude Sieber. Vita Zahnfabrik
- 8. "Past Future" Envision 77 Heart Beats. Naoki Hayashi. Ishiyaku Publishers, Inc. 2011
- 9. "Analysis" The New way in dental communication. Gérald Ubassy. Teamwork Media Srl. 2003
- 10. "Sombras, un mundo de color". Agust Bruguera. Puesta al día en Publicaciones SL. 2002
- 11. "Prótese Fixa" Protocolo cerámico. Pablio Caetano. Colecao Apdesp Br. Volume II Napoleao Editora 2015



Bill Marais

Born in Johannesburg, South Africa, Bill moved to Cape Town at the start of his high school years. In 1993, he graduated as a Registered Dental Technician, after 4 years of study in Dental Technology (recognized Bachelors Degree in Prosthetic Sciences in the USA), from Cape Peninsula University of Technology. After working in a dental lab in South Africa for 3 years, Bill immigrated to the USA in 1996. In 1999, Bill opened his own lab, Disa Dental Studio, in Santa Monica, California. Bill moved his family and Disa Dental Studio to Portland, Oregon, in January 2011. Disa Dental Studio is a one-man lab focusing on high-end, complex, combination cases.

Implant supported hybrid restoration with thimble CROWNS

By Bill Marais, South Africa

This case presentation describes the step by step manufacturing of an implant supported hybrid bridge using the thimble crown technique. On a PEKK framework multiple GC Initial LiSi Press copings will cemented and GC GRADIA™ PLUS Gum will be used for gingiva reproduction.

Framework preparation



Sandblast framework with AI_2O_3 (50µm, 0.2MPa)



In order to avoid contamination it is advisable to wear rubber gloves.Steam clean and air dry.



Easy mixture of O-Base with OA (cfr. Opaque Mixing Ratio)

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Application of a thin wash opaque layer. Light-cure.





Application of a second opaque layer. Light-cure. Proceed until the complete framework is masked.



Etching process



Sandblast LiSi Press units with Al_2O_3 (50 μ m, 0.2MPa) to remove all possible contaminations.

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Remove glaze layer on the edges of the LiSi Press units to optimize etching procedure in a later stage.

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Apply hydrofluoric acid gel (5-9%) for 60 seconds to the inner surfaces of the restoration. Clean with water.

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Result of acid etch on LiSi Press units.



Apply CERAMIC PRIMER II or G-Multi PRIMER and allow to dry.

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Cementing of LiSi Press units using G-CEM LinkForce™.



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Removal and cleaning of G-CEM LinkForce™ access. Please make sure you thoroughly clean approximal spaces.

Step 1 – Bone tissue simulation







Application of GRADIA® Plus Heavy Body Dentin A3 to simulate the bone structure.

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Light-cure.

Step 2 – Application of different GC GRADIA® PLUS Gum Shades



Selection of different heavy body gum shades.

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Application of GC GRADIA® PLUS Heavy Body Gum GHB-2. Goal is to achieve with this step 95% of the final shape & texture. Do not work with an extreme light source to avoid a pre-curing of the gum base material.

Step 3 - Characterization of the gum base material



Next step is characterization with GC GRADIA® PLUS Lustre Paint into and onto the gum paste material.

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Push the GLP-Bright red into the soft gum base material with a hard brush.



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Use LP-Cream to paint onto the gum base material with a round brush. Afterwards push LP-Cream into the soft gum base.



LP-B is used to create warmth at the junction of the tissue and the cervical part of the tooth. Alternatively Optiglaze Color orange can be used.

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To create veins and blood vessels, use LP-Blue.



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Result before light-curing. Light-cure.

Step 4 – Final shaping of the dento-gingival junction



Apply GHB-3, as final layer to seal the lustre paint and to achieve 100% of the final shape and texture, trying to avoid any grinding.







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Full light-cure with AIR BARRIER.





Apply G Multi PRIMER onto the cervical part of the teeth. Alternatively Ceramic PRIMER II can be used.



Use LP-CL to seal the margins. Consistency can be adapted using diluting liquid. Alternatively also Optiglaze Color can be used.

Final Result





Ms. **Myriam Alonso Fuente** graduated at the Complutense University of Madrid (UCM), in Spain. Thereafter, she completed the three-year postgraduate program of prosthodontics at the at the same university (UCM) and then obtained the title of "Expert in aesthetics and restorative dentistry" at the European University of Madrid (UEM). She won the first prize in the GC Europe Essentia Academic Excellence Contest 2016-2017.

Essentia Academic Excellence Contest: winning case

By Myriam Alonso Fuente, Spain

Each year, GC Europe is organising the Essentia Academic Excellence Contest. For this year's edition, Undergraduate and Postgraduate students in Dentistry from several universities and countries were participating. From each country, the winners of the national contest were invited to the GC Europe Campus in Leuven, Belgium to compete for the European title and win fantastic prizes.

Each case was evaluated by an independent jury on originality, complexity, quality and presentation. In 2017, Myriam Alonso Fuente from Spain won the first prize with the case presented in this article. A 45-year-old female patient was referred to the Aesthetic and Restorative Dentistry Course of European University of Madrid. She was unhappy with the appearance of her anterior teeth, so she wanted to change her old restorations and close the diastema.

After clinical examination we took photographs and impressions for diagnostic wax-up and decided to do a gingivectomy to improve the proportions of the teeth. As for the treatment, we planned to make direct composite veneers on the upper incisors with the Essentia composite system.

The patient did not have any medical problems. Pain and premature contacts with the lower incisors were absent and all teeth responded positively to vitality tests. The patient had normal expectations towards the treatment outcome and was very cooperative but was rather demanding too.

First, we made an aesthetic analysis:

1.Dentolabial relationships

The patient did not have competent lip closure; the cervical third remained exposed unless she forced the lips to close (Figure 1). In rest, the incisal edge contacted with the lower lip (Figure 2).



Fig. 1: Initial situation; Closed mouth



Fig. 3: Initial situation; Smile

She had a gummy smile, with a smile line parallel to her lower lip. Teeth 16 to 26 were exposed; the smile was slightly asymmetric and the facial midline coincided with the dental midline (Figure 3). She had lips of medium thickness and the occlusal plane was parallel to the commissural line.

2.Gingival margins, dental proportions and diagnostic wax up

The gingival margins were very irregular and proportions were incorrect; the teeth were rather wide, so we wanted to improve these proportions to obtain a harmonious smile (Figure 4). We decided to resect some gingival tissue, because the incisal edge was already in contact with the lower lip in rest. Hence, if we lengthened the incisal edge, it would interfere with disclusions.

A summary of the diagnosis and treatment options is given in Table 1. We opted for a treatment with composite veneers because of financial reasons and because we would be able to restore the teeth in a more minimally invasive way in this case. A correct anatomical shape, correct functional relationship with the antagonist and good colour integration with appropriate micro and macro texture could be obtained with composite as well as with ceramics.



Fig. 2: Initial situation; Mouth in resting position



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Fig. 4: Marginal outline of the teeth

Table 1. Overview of the diagnosis and treatment options

Diagnostic elements

- Disproportional crowns of the maxillary incisors
- Diastema between maxillary incisors
- Gingival hyperplasia
- Asymmetric gingival margins
- Buccoversion of tooth 22
- Mesioversion of tooth 11, 21, 12

Treatment options

- Ceramic veneers on tooth 11, 12, 21, 22
- Composite veneers on tooth 11, 12, 21, 22

A diagnostic wax-up was prepared to evaluate the desired changes in tooth shape, inclination and morphology (Figure 5). From the diagnostic wax-up, it was clear that



Fig. 5: Diagnostic wax-up

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distal angles needed to be rounded and that a gingivectomy would be needed to improve proportions (Figure 6). Using a putty key, it was transferred to a mockup in the mouth (Figure 7). The desired changes were evaluated with the patient. Meanwhile, the mock-up also served to guide the gingivectomy (Figure 8). The osseous crest was probed on the vestibular side and pockets were larger than 3 mm. One millimetre was resected to level the tissue. The cervical outline was restored with composite to support the gingival tissue during the healing period (Figure 9).

After one month, the gingiva had healed sufficiently to proceed with the restorative treatment (Figure 10). Shade selection was done with the 'button technique' and polarised light. The Light Enamel (LE) shade and both



Fig. 6: Diagnostic wax-up outline; the distal angles need rounding and a minor gingivectomy would improve proportions



Fig. 7: Intraoral mock-up



Fig. 9: Composite was added gingivally before the healing



Fig. 8: Mock-up guided gingivectomy



Fig. 10: After one month healing period

Essentia Academic Excellence Contest: winning case

Medium (MD) and Dark Dentin (DD) of the Essentia composite system were selected (Figure 11). After absolute isolation with rubber dam (Figure 12), old composite restorations were removed and the distal angles were rounded (Figure 13). Adjacent teeth were isolated with Teflon tape and the enamel was etched with 37% phosphoric acid (Figure 14) before applying the adhesive (Figure 15). A silicone key based on the wax-up (Figure 16) was used to create the palatal shell with Essentia LE (Figure 17).



Fig. 11: Polarised image for Essentia shade selection using the composite button technique



Fig. 12: Isolation with rubber dam



Fig. 13: After preparation



Fig. 14: Etching with H3PO4



Fig. 15: Adhesive application



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Fig. 17: Creating the palatal shell with Essentia LE



Fig. 16: Silicone key



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Fig. 18: Dentine stratification with Essentia MD and DD



Essentia Academic Excellence Contest: winning case

Next, the body of the tooth was built up (Figure 18). The contact points were reproduced using posterior sectional matrices. This way, a good proximal contour could be created. After the dentine stratification with MD and DD,

the vestibular surface was created with another layer of LE (Figure 19-20). The final result shows excellent shade matching under different light sources and from different angles (Figure 21-23).



Fig. 19: Vestibular enamel: Essentia L_E

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Fig. 20: Final restorations



Fig. 21: Final restorations: polarised image



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Fig. 22: Final restorations: frontal view





Fig. 23: Final restorations: lateral view, studio flash light a) left view b) right view



Dr. **Miguel A Iglesia Puig** has a full-time private practice in Zaragoza, Spain. He has more than 23 years of practice in oral implantology and general dentistry, and more than 8 years of clinical experience with the Aadva GC Implant System. He obtained his Dental Degree as well as his Postgraduate Implant training and his PhD at the Basque Country University (UPV) in Bilbao (Spain).

Dr Iglesia has written over 40 scientific articles and 4 textbook chapters. In 2001, he received the Annual Award of the Spanish Society of Prosthodontics for the best original research study. Dr Iglesia serves on the Scientific Council of the Aragón Dental Association and he is part of the editorial board and the peer-review team of various international dental publications. Since 2010, he is an external consultant referee of The International Journal of Oral and Maxillofacial Implants.

Managing congenitally missing **lateral incisors with implants** The key factors to reach an excellent result

By Dr. Miguel A Iglesia Puig, Spain

Congenital missing teeth is a highly prevalent dental anomaly, with a 5.5% prevalence in permanent teeth, excluding third molars¹. Maxillary lateral incisors are one of the most affected teeth with agenesis. Besides an unfavourable appearance, patients with missing teeth in the anterior zone may suffer from malocclusion, periodontal damage, insufficient alveolar bone growth, reduced chewing ability and other problems².

Implant-supported single tooth restoration in the aesthetic area is currently a well-documented and predictable treatment option to replace a missing single tooth in this zone³. Cases of dental agenesis of anterior teeth are challenging, and many specific aspects have to be carefully evaluated. Patients usually need orthodontic treatment in order to correct the malocclusion resulting from this absence. A correct and meticulous diagnosis is mandatory to decide whether spaces closure and canine substitution⁴, or space opening to create enough width for the restoration⁵, is the appropriate treatment plan. Biological aspects are also very important. Usually the present bone is poor in quality and quantity, and both have to be improved and corrected in the surgical phase. All the issues of an aesthetic case are also important to consider when restoring missing teeth: smile line, shape and size of adjacent teeth, soft tissue volume, periodontal biotype, need for temporisation, importance of flap design and surgical technique, aesthetic materials... always with a global vision on patient's health, function and smile.

The case presented brings together all this aspects, using the Aadva Implant System (GC Tech) and a milled zirconium abutment (GC Tech Milling Centre, Leuven, Belgium) covered with Initial ceramic (GC), highlighting the importance of a correct diagnosis, a careful and minimally invasive surgical approach, and a correct selection of materials.

CASE REPORT

A 29-year old male patient presented with agenesis of the right upper lateral incisor. Orthodontists decided to open the space to replace this missing tooth, and when the mesio-distal and inter-occlusal spaces were adequate to replace it (Figures 1-2), the patient was referred to us.

After clinical, and radiographic examination (CBCT and periapical)

and diagnostic assessment (including casts), the therapeutic plan was drawn up including placement of a narrow diameter implant with delayed loading, a provisional implant-supported restoration after second-stage surgery, and a metal-free screw-retained esthetic implant definitive single crown. The CBCT diagnosis found enough bone availability in the coronal part of the future implant, but a concavity in the middle and apical zone of the buccal plate (Figure 3). The patient had a low smile line and a thick periodontal biotype.

Implant surgery began with a crestal incision slightly deviating towards palatal, including intrasulcular in the distal part of the right upper central and mesial of the right upper canine, and avoiding vertical releasing incisions.

Bone was prepared carefully with a drilling sequence adapted to bone quantity and quality, with a non-







Figure 3. CBCT: Sufficient bone in the coronal part, and a concavity in the middle and apical part.

Figure 4. Drilling sequence: a) Initial bur;

b) 2 mm twist drill up to 7 mm length;
c) 2 mm osteotome up to working length;
d) 3 mm osteotome up to working length;
e) Tapered implant drill narrow up to 12 mm.













Figure 5. Checking three-dimensional position of the future implant.

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irrigation low-speed technique (50 rpm) and including the use of manual osteotomes between the uses of drills (Figure 4). Using osteotomes, the aim was to preserve as much as possible the low-density bone, compact it, and expand the buccal ridge in the middle and apical part⁶.

Implant site was slightly underprepared to ensure high implant stability, avoiding countersinking in order to engage as much of the crestal bone as possible and to avoid damaging of the cortical bone. When the bone was prepared



Figure 6. Aadva tapered implant narrow.

and the three-dimensional position of the future implant was checked with a direction and depth indicator (Figure 5), one rough-surfaced grade 5 titanium implant (12 mm tapered implant narrow, GC Implant Aadva) (Figure 6) was placed, according to the treatment planning with 35 N of torque (Figure 7). Adequate apicocoronal position was achieved (Figure 8) and confirmed with a manual insertion torque wrench, leaving as much width as possible in the buccal plate (Figure 9).



Figure 7. Implant insertion.



Figure 8. Adjustment of implant depth position with a manual insertion torque wrench: Apically there is 3 mm space between the implant platform and the cemento enamel junction of adjacent teeth.



Figure 9. Occlusal view of the placed implant. Width of the buccal bone is 2.5 mm, which is important for long-term peri-implant tissues stability.

After suturing (Figure 10), an acrylic resin tooth was attached to the orthodontic wire as a provisional. After healing and a 3-month uneventful osseointegration period (Figure 11),



Figure 10. Wound sutures. a) Occlusal view; b) Buccal view





Figure 11. One-week postop. a) Occlusal view; b) Buccal view.

Figure 12. Second-stage surgery with a minimally invasive approach. a) Incision; b) Occlusal view with healing abutment; c) Buccal view.



the implant was uncovered with a minimally invasive incision (Figure 12), and one day later, a screw-retained acrylic provisional was connected to the implant (Provi Abutment Hexed Narrow, GC Implant Aadva; Figure 13).





Subgingival emergency profile had a concave design in order to allow the soft tissue to adapt to it without pressure (Figure 14).

The width of this provisional was the same as that of the upper left lateral



Figures 13. Screw-retained acrylic provisional crown. Concave emergency profile design.



Figures 14. After placement of the acrylic provisional crown.

incisor, and mesio-distal small remaining spaces were closed with orthodontic treatment (Figure 15).

Soft tissues were healing and adapting to the provisional and the brackets were removed (Figure 16). The teeth were whitened by home bleaching during three weeks (Figure 17). Figure 15. Orthodontic spaces closure. a) After 1 week; b) After 2 weeks; c) After 3 weeks.









Figure 16. Soft tissues healing 3 months after second-stage surgery.

An individualised impression post copying the subgingival part of the provisional was prepared (Figure 18), and the final impression was made (Figures 19 to 21).





Figure 17. Home whitening treatment. a) Preoperative; b) Postoperative.



Figure 18 a-d. Preparation of an individualised impression post copying subgingival part of the provisional.





Figure 20. Individualised impression coping in place.



Figure 21. Final pick-up impression.

An individual zirconium CAD-CAM abutment (GC Tech Milling Centre) was covered with ceramic (Initial Ceramics, GC) and luted with a resin





Figures 22-23. Screw-retained single-unit final restoration: individual zirconium CAD-CAM abutment covered with ceramic and cemented to a metallic base.



This final restoration was screwed on the implant (Figure 24).

The final restoration demonstrated excellent aesthetics and improved integration, shape and shade at the 3-year follow-up appointment (Figure 25).



Figure 24. Final restoration screwed on the implant.



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Figure 25. Frontal views in occlusion. a) Preoperative; b) Postoperative; c) 3-year follow-up.

DISCUSSION

A correct diagnosis is crucial when restoring missing teeth in the aesthetic zone with implant-supported restorations. Analysing carefully and managing properly orthodontic, biologic and aesthetic aspects may lead to successful results. In this case some of these aspects were not favourable, like bone volume and quality. As the bone width was wide enough in the coronal part of the implant, and the patient had a low lip line and thick periodontal biotype, no bone volume augmentation was needed, and the use of osteotomes and a careful surgical technique were enough to solve it.

A minimally invasive surgical approach is mandatory in the anterior region, using conservative incisions in surgeries. Also low speed drilling sequence, infra-preparation and osteotomes were used in order to avoid overpreparation, overheating and to minimise the destruction of the cancellous bone. To achieve implant stability, a proper implant design and minimal and precise manipulation is required.

The implant was placed while the patient was in orthodontic treatment, allowing attaching the immediate provisional to the wire, and facilitating the space closure when implantretained provisional was connected. Evaluating the case as a whole is mandatory, because sometimes patients with dental agenesis have other dental anomalies in adjacent teeth. Those were not present in this case. Nevertheless, from the aesthetic point of view there was an unfavourable teeth colour, which was improved by tooth whitening treatment.

The use and selection of the adequate materials for the restoration, and a meticulous work by the lab technician are essential points to achieve excellence. Computer aided design and manufacturing of the zirconia custom abutment, with the proper use of a ceramic coating worked with care, let the clinician get a successful and perfectly integrated metal-free restoration.

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REFERENCES

- 1. Polder BJ, et al. A meta-analysis of the prevalence of dental agenesis of permanent teeth. Comm Dent Oral Epid 2004; 32: 217-26.
- 2. Rakhshan V. Congenitally missing teeth (hypodontia): A review of the literature concerning the etiology, prevalence, risk factors, patterns and treatment. Dent Res J 2015; 12: 1-13.
- 3. den Hartog L, et al. Treatment outcome of immediate, early and conventional single-tooth implants in the aesthetic zone: a systematic review to survival, bone level, soft-tissue, aesthetics and patient satisfaction. J Clin Period 2008; 35: 1073-1086.
- 4. Zachrisson BU, et al. Congenitally missing maxillary lateral incisors: canine substitution. Am J OrthodDentofacOrthoped 2011; 139: 434-45.
- 5. Kinzer GA, etalk. Managing congenitally missing lateral incisors. Part III: single-tooth implants. J Esthet Rest Dent 2005; 17: 202-10.
- 6. Summers RB. A new concept in maxillary implant surgery: the osteotome technique. Compendium 1994; 15: 152-6.

Notes		

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