REFLECT

3/12

Direct and indirect – successfully combined

Fabricating esthetic restorations with IPS Empress Direct

Harmoniously integrated

All-ceramic restorations with IPS e.max Press Abutment Solutions

Analyzed, pressed and layered

Excellent esthetics due to skilfully combined materials

ivoclar vivadent®
passion vision innovation

Dear Readers

Ivoclar Vivadent is dedicated to delivering innovative dental solutions for quality esthetic dentistry. Education plays a pivotal role in enhancing product performance and patient care. We are proud to offer education options on the internet, live through our network of International Centers for Dental Education (ICDEs) and in print form through magazines. Reflect is unique and allows you to learn from the world's best as they present exceptional case studies.

You can experience our innovation in the products we develop and in the education we can provide. You can also feel the passion of our people who touch our customers. Ivoclar Vivadent continues to follow our vision by strengthening our commitment to our customers through education expansion around the globe. In fact, our network of International Centers for Dental Education serves to bring techniques and products, like the ones shown in Reflect, to life. We are celebrating the opening of new and expanded ICDE facilities in Australia, China, Russia, Turkey, the UK, Brazil, Mexico, Canada and the US. As the head of the Canadian organization, I was proud to cut the ribbon for our new Canadian home near Toronto with a dedicated International Center for Dental Education, the first of its kind in Canada, offering an outstanding lecture theatre, state-of-the-art laboratory for hands-on training programs and a clinical operatory.

I hope you enjoy the articles and case studies in this issue of Reflect. They are written by leading dental professionals and exhibit the most current innovations from Tetric EvoCeram Bulk Fill and Ivobase, and the latest from IPS e.max including the IPS e.max Press Abutment Solutions. I encourage you to seek new educational opportunities through Reflect or our outstanding ICDE facilities worldwide.

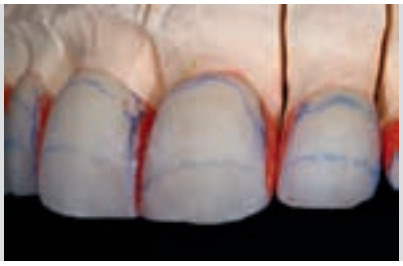
Yours

Sarah Anders
General Manager, Ivoclar Vivadent, Canada
Vice President, Ivoclar Vivadent, Inc.

CONTENTS

Page 7

Page 10



Page 22

Take advantage of the versatile options offered by digital magazines for tablets and experience the iPad edition of the article: "Harmoniously integrated – All-ceramic restorations with IPS e.max Press Abutment Solutions" by Dr Fernando Manfroi and Yunus Sert (pp. 8-11). Benefit from the interactive photo sequences with additional pictures, and learn more about the products used and the authors.

PUBLISHER'S CORNER

Publisher
Ivoclar Vivadent AG
Bendererstr. 2
9494 Schaan/Liechtenstein
Tel. +423 / 2353535
Fax +423 / 2353360

Publication
3 times a year

Total circulation
69,000
(Languages: German, English, French, Italian, Spanish, Russian)

Coordination
Lorenzo Rigliaco
Tel. +423 / 2353698

Editorial office
Dr R. May, N. van Oers, L. Rigliaco, T. Schaffner

Reader service
info@ivoclarvivadent.com

Production
teamwork media GmbH, Fuchstal/Germany

Direct and indirect – successfully combined

Fabricating esthetic restorations with IPS Empress Direct

Dr Arun Rajpara, Valsad/India

What is essential in esthetic dentistry is not only that the patient's beautiful smile is restored, but also that the restoration is long-lasting.

The advances in adhesive technology have encouraged clinicians to increasingly use composite resin for the replacement of missing tooth structure. Modern dentistry offers us a wide array of different materials, techniques and procedure options to satisfy our patient's needs. In understanding the shade of teeth we are attempting to restore what is missing in a natural way. To achieve successful outcomes, we need materials that are similar in their light refractive qualities to the missing tooth structure, i.e. to replace dentin with a dentin substitute and enamel with an enamel substitute [4,5]. This article describes how the different materials can be used to achieve highly esthetic restorations in anterior and posterior dentition.

Fig. 1 Frontal view of the initial situation: carious lesions, labial and proximal caries as well as enamel hypoplasia were present.

Fig. 2 Starting situation: The posterior teeth also required treatment. The molars were prosthetically restored. After completing the treatment in the posterior region, the anterior teeth were restored.

Fig. 3 After caries removal, the Class III cavities in the anterior region were restored with IPS Empress Direct …

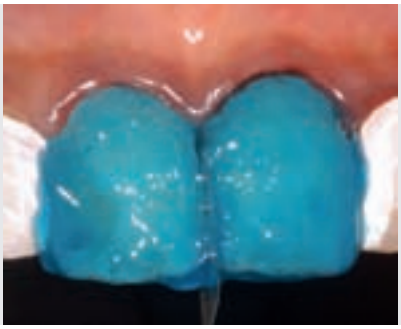


Fig. 4 … and the teeth were conditioned to prepare them for direct veneering.

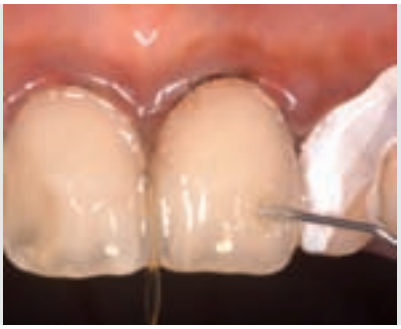


Fig. 5 ExciTE F adhesive was applied with the VivaPen.

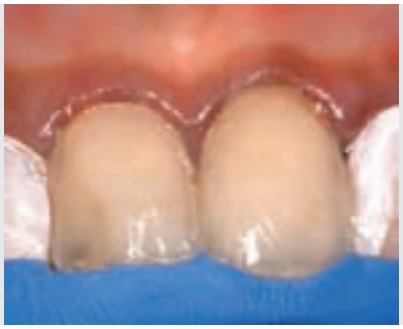


Fig. 6 Try-in of the putty matrix and placement of the first IPS Empress Direct increment

Clinical case

An 18-year-old female patient presented with tooth ache, multiple carious lesions and discolouration in the anterior and posterior teeth (Figs 1 and 2). The patient had undergone many dental procedures in the past. She had a history of orthodontic treatment in which her mandibular first premolar teeth were extracted. Our primary goal was to relieve the patient's pain. In order to achieve this, several teeth had to be endodontically treated. Moreover, the old posterior PFM crowns were removed and replaced with all-ceramic crowns (IPS e.max® lithium disilicate glass-ceramic). Additionally, the carious lesions in the posterior region were restored with a direct resin restorative (IPS Empress® Direct).

After successfully completing the treatment in the posterior teeth, we focussed on the reconstruction of the anterior teeth. After considering all the different restorative options, we opted for direct restorative treatment with composite resin veneers.

Veneers made from composite resin

After administering local anaesthesia, the carious tissue was excavated with high-speed diamond burs and slow-speed round burs. A flame-shaped diamond bur and coarse finishing discs were used to prepare the fine details in the cervical area and on the labial surface of the tooth. On the labial surface only about 0.8 to 1 mm of the enamel was reduced to preserve as much natural enamel as possible. A short bevel was prepared at the dentin-enamel junction in the cervical region and also in the area of the proximal cavities (Class III preparation). Subsequently, the prepared surfaces were thoroughly rinsed with water.

As there were Class III cavities, we completed these restorations first (Fig. 3). This was followed by shade selection, and then direct veneering with IPS Empress Direct composite material was performed. For this purpose, the prepared upper central incisors were etched with 37 % phosphoric acid gel (Total Etch) for 15 seconds (Fig. 4). Neighbouring teeth surfaces were protected by covering them with Teflon tape. After etching, the teeth were rinsed with water and dried, taking care not to dry them to the point of desiccation. Subsequently, the total-etch adhesive ExciTE® F in the VivaPen® was applied and brushed into the enamel and dentin surfaces for 10 seconds (Fig. 5). A gentle stream of air was used to disperse the excess into a thin layer. Then the adhesive was light-cured for 10 seconds with the Low Power mode of Bluephase® 20i curing light.

A putty matrix was prepared from the wax mock-up on the stone model (Virtual® Putty). The putty matrix, once placed in the patient's mouth, would be used as a spatial reference and three-dimensional guide for the placement of the composite resin veneers [1,3]. After positioning the putty matrix on the teeth, the first layer of composite resin (IPS Empress Direct Trans 30) was placed on the incisal edge and the proximal aspects of the palatal surface (Fig. 6).

Fig. 7 A layer of IPS Empress Direct Dentin A2 was applied to the cervical area, extending it to the middle of the incisal third.

Fig. 8 A translucent composite shade was placed between the dentinal lobes in the incisal third and …

Fig. 9 … the entire surface was covered with an enamel shade.

Fig. 10 The highly esthetic appearance of the veneers after polishing

Figs 11 and 12 Occlusal view of the final result. The affected teeth in the posterior region were restored using an indirect technique, while for the restoration of the upper and lower anterior teeth, IPS Empress Direct composite resin was used.

Then the putty matrix was removed and the cervical area built up with a layer of IPS Empress Direct Dentin A2, extending it to the middle of the incisal third (Fig. 7). Small dentinal lobes were prepared in the still soft composite resin using the OptraSculpt modelling and sculpting instrument. After polymerizing this dentin layer, the grooves created between the lobes were filled with a highly translucent material (IPS Empress Direct Opal) and light-cured for 15 seconds using the Soft-Start mode of Bluephase 20i.

Fig. 13 The situation after completion of the treatment in the anterior region

Fig. 14 The happy smile of the patient

Clinicians should remember that chromatic or achromatic enamel shades are more translucent than the dentin shades, which are slightly more opacious and thus have a greater impact on the chroma of the teeth.

Then a layer of IPS Empress Direct Enamel A1 was used to complete the labial surface from the middle of the incisal third to the incisal edge (Figs 8 and 9). The last layer of this veneer restoration was Empress Direct Trans 20 composite, which was applied to the entire labial surface in a thin layer. The final anatomy was sculpted using OptraSculpt and a brush.

The same procedure was repeated on the neighbouring tooth. The proximal contours were carefully sculpted to develop proper areas of deflection and reflection of light, taking care to maintain the symmetry between the right and left maxillary central incisors [2]. The other teeth affected were restored in a similar manner.

Finishing and polishing

After considering the primary anatomy, the secondary and tertiary anatomy was crafted using 12-fluted carbide and diamond finishing burs. The Astropol® and Astrobrush® finishing and polishing system was used to impart a high lustre while maintaining the previously created surface texture and anatomy (Fig. 10). Astrobrush was used at a low speed without pressure to achieve a high gloss finish.

Conclusion

Esthetic restorative dentistry strives to reproduce the natural anatomy, translucency and characteristics of natural dentition. In the clinical case presented, interdisciplinary procedures along with the proper selection of materials helped the clinician to achieve the desired result. The combination of a direct adhesive technique (IPS Empress Direct in the anterior region) and an indirect technique (IPS e.max in the posterior region) allowed long-lasting and natural-looking restorations to be created. The patient was extremely happy with her new, beautiful smile (Figs 11 to 14).

A literature list is available from the editors on request.

Contact details:

Dr Arun Rajpara
Soham Dental
Center for Cosmetic & Advanced Dentistry
Opp. Lal School, Halar Road
Valsad-396001
India
arunrajpara@gmail.com

Also available for the iPad

Harmoniously integrated

All-ceramic restorations with IPS e.max Press Abutment Solutions

Dr Fernando Manfroi, Rio Grande do Sul/Brazil, and Yunus Sert, Stuttgart/Germany

At first glance you wouldn't guess how many carefully planned steps are necessary to integrate tooth replacements into the oral cavity harmoniously.

Materials that are consistently further developed and the efficient application of methods associated with these materials assist us in accomplishing our goal of creating "harmoniously integrated tooth replacements". This report describes how we created discreet tooth replacements involving an implant-supported restoration and several single crowns.

The patient presented at the practice with the desire to improve the esthetics and function of his dentition. His professional occupation requires a well-groomed appearance. He also suffered from severe pain caused by various carious lesions. Following an initial review and consultation, we decided, together with the patient, to opt for a high-end reconstruction consisting of crowns, inlays and an implant. All-ceramic materials were considered an appropriate choice for the tooth replacements. We decided to opt for lithium disilicate (LS_2) glass-ceramic (IPS e.max®).

Fig. 1 Pre-operative situation:
Fractured composite filling in the upper jaw, …

Fig. 2 … severely modified contours of a metal-ceramic bridge in the lower jaw and…

Fig. 3 … unsightly root canal fillings in the lower jaw

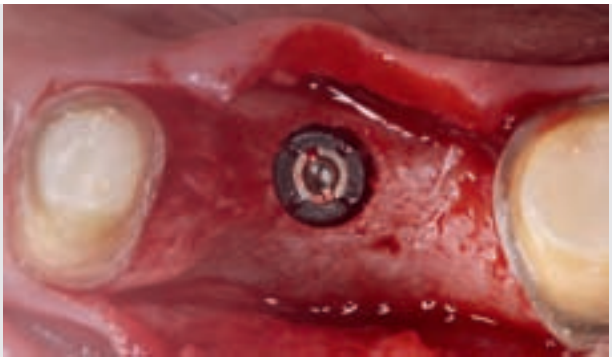


Fig. 4 An implant was inserted in the region of tooth 36.

Fig. 5 Try-in of the customized impression cap

Fig. 6 Wax-up of the maxillary restoration

This material offers a flexural strength of 400 MPa and is capable of meeting exacting esthetic demands. Given its inherent fluorescence and capabilities of individualized customization, the material enables users to achieve a natural looking esthetic result. We selected the pressed monolithic (fully anatomical) method for the treatment of the present case. In addition to conventional indications, such as inlay, onlay, and crowns, this material is suitable for three-unit premolar bridges or – as in the present case – for implant-supported hybrid restorations (in the combination of titanium basis and lithium disilicate glass-ceramic).

Pre-operative situation

The posterior teeth of the second quadrant showed fractured composite fillings, under which secondary caries had formed (Fig. 1). The fractured restoration in the upper jaw caused non-occlusion and incorrect loading. In addition, the fillings on teeth 24 to 27 were in an irreparable state and had to be removed. To improve the bite, the metal-ceramic bridge on teeth 35 to 37 had been heavily adjusted by grinding in the past (Fig. 2). This restoration was also in a state of disrepair and was therefore removed. The root canal fillings under the restoration were extremely unsightly (Fig. 3) and were consequently replaced with tooth-coloured composite. This measure helped us to achieve a natural looking substrate. The patient desired a fixed lower jaw restoration that is easy and convenient to clean. To achieve appropriate stability and long-term durability, an implant was inserted in region 36 (Fig. 4) after the preliminary treatment had been completed. The primary stability of 50 Ncm allowed us to place a temporary bridge immediately after the insertion of the implant. This bridge was also instrumental in the contouring of the gingiva.

Selection of the shade and press ceramic ingot

To achieve a natural looking restoration, both the die and tooth shade were determined.

> The die shade plays an essential role because it significantly affects the final result, particularly in conjunction with translucent materials.

After shade selection, we chose a low-translucency IPS e.max Press LT ingot for the abutment to prevent the titanium base from shining through (LT = Low Translucency). High-translucency IPS e.max Press ingots were chosen for the inlays, partial crowns and crowns (HT = High Translucency).

Preparing the models

At the first step, a customized impression cap was fabricated to help the contouring of a natural emergence profile. A try-in allowed us to check the fit and afforded us the opportunity to estimate the effect on the soft tissues (displacement) (Fig. 5). After impression taking, the models were poured and fitted together in the correct position and with an accurately fitting occlusion.

To see how much space was available, we first created the inlays and partial crowns (Fig. 6) followed by a functional wax-up of the lower jaw. We also fabricated a silicone rim that would serve us as a reference in the subsequent fabri-

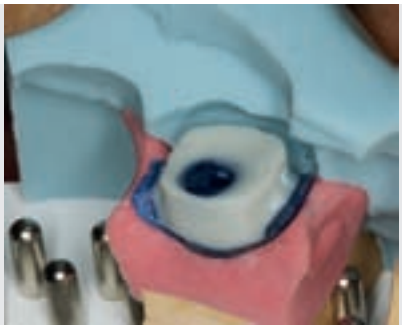


Fig. 7 The abutment was checked with a silicone rim.

Figs 8 and 9 The abutment was bonded to the titanium base.

cation of the abutment. The more accurately we work at this stage, the more precise the pressed restorations will be. As part of a backward planning approach, the mandibular wax-up was of considerable help in the fabrication of the abutment. The basic framework of the abutment was created using light-curing burn-out resin and then adjusted by grinding to match the path of insertion of the neighbouring teeth. Subsequently, the abutment was evaluated with the silicone rim and missing areas were completed with wax (Fig. 7).

Pressing

The wax objects were invested using IPS® PressVEST Speed material. When spruing the pattern, we paid attention to align the wax wire in parallel to the screw channel to make sure that the investment material would not fracture. The investment material was poured slowly into the investment ring, allowing it to rise in the screw channel continuously without forming bubbles. The press procedure was carried out in a Programat® EP 3000 combination furnace according to the manufacturer's instructions.

After completion of the press procedure, the objects were divested with polishing beads (4 bar/58 psi). Fine divestment was carried out at a maximum pressure of 2 bar/29 psi. The reaction layer was first dissolved with IPS e.max Press Invex Liquid and then removed by blasting (Al_2O_3, 50 µm, 2 bar pressure at max.). After the sprues had been separated, the attachment points were smoothed out. The inner aspect (screw channel) was checked under a microscope and then the object was carefully fitted onto the titanium base. Subsequently, the abutment was finished with ease using a diamond-coated silicone polisher. The other maxillary components were pressed, separated and fitted following the same procedure.

Bonding the glass-ceramic IPS e.max Press restorations to the titanium base

Prior to bonding, the glass-ceramic portions and titanium base were blasted with 50-µm Al_2O_3 at a maximum of 1 bar/14.5 psi pressure to achieve a clean surface (if the Ivoclar Vivadent Instructions for Use are followed, the glass-ceramic is not blasted but only cleaned). To obtain a reten-

Fig. 10 Wax-up of the mandibular restoration

Fig. 11 Accurately fitting maxillary restoration

Fig. 12
Individualized mandibular restoration on the model

Fig. 13 Inserted abutment

Figs 14 and 15 The restorations blend beautifully into their surroundings.

tive bonding surface on the all-ceramic restoration, IPS Ceramic Etching Gel (5% hydrofluoric acid) is applied. A small amount of wax may be applied to the external surfaces, i.e. glazed areas, to protect them. After the etching gel had been allowed to react for 20 seconds, the bonding surface was rinsed with water and dried. Next, the bonding surface was silanated with Monobond Plus primer for 60 seconds. This procedure provides a strong bond between the restoration and cementation material. Self-curing Multilink® Implant composite was applied to both the abutment and titanium base (Figs 8 and 9) and held in the final position for about 5 seconds, applying even pressure. Excess was removed while the material was still in a pliable state. Then the cementation joint was smoothed and polished with rubber polishers.

Completing and inserting the mandibular restoration

The geometry of the hybrid abutment facilitated the insertion procedure; excess cementation material was easy to remove. The possibilities for customized design of lab fabricated abutments allow us to achieve outstanding esthetics, high fracture resistance and excellent accuracy of fit.

We created a control key to insert the abutment. Burn-out resin was used to fashion a capping on top of the abutment and model the teeth (Fig. 10). Subsequently, these patterns were sprued, invested, pressed and carefully fitted. The occlusal surfaces of all crowns were characterized with IPS e.max Ceram Essence. To individualize the tooth necks, IPS e.max Ceram Shades (Figs 11 and 12) were applied. With the help of the control key, the implant was secured in the mandible (Fig. 13). The single crowns were also inserted without any difficulty. IPS e.max Press restorations can be placed adhesively, self-adhesively or conventionally, depending on the indication. Given their true-to-nature shade effect, the restorations blend seamlessly into the existing oral surroundings (Figs 14 and 15).

Conclusion

Detailed planning and complete compatibility are decisive for the lasting successful application of materials for abutments and implant-supported restorations. Long-term studies have confirmed that the IPS e.max Press glass-ceramics show good compatibility with the oral soft tissues (see Scientific Report Vol. 01/2001 – 2011). The outstanding material properties and the customized fabrication in the laboratory offered us the opportunity to meet the esthetic demands of the patient.

To go directly to the iPad version (in English and German):

Scan the QR code with your iPad
or enter the following link:
http://www.ivoclarvivadent.com/reflect

Contact details:

Dr Fernando Manfroi
Saldanha Marinho St., 30/404
Menino Deus, Porto Alegre
Rio Grande do Sul
90160 - 240
Brazil
fernandomanfroi@me.com

Yunus Sert
Dental Design Sert
Vaihinger Markt 31
70563 Stuttgart
Germany
info@dentaldesigner.de

Convincing bridge design

Screw-retained implant-supported bridge: A fixed restoration including the reconstruction of prosthetic gingiva
Cesare Ferri, Rome/Italy

Careful analysis of all the parameters influencing the restoration constitutes the basis for accurate planning and for achieving reliably predictable results. Combined with a well thought-out design, this approach enables dental professionals to achieve restorations that will stand the test of time.

Creating an implant-supported prosthetic restoration presents a tough but stimulating challenge for both dentists and dental technicians. Welcome though these challenges may be, they are also likely to involve unforeseen complications and necessitate compromises, which may diminish the outcome and disappoint the expectations of the patient. This situation can be avoided by careful planning before the restorative procedure is commenced. A prudently planned intervention is based on a detailed review including the following parameters: structure and quality of the bone, general health of the patient, clinical situation of the periodontium, patient expectations as well as an assessment of the esthetic and functional aspects present and in need of reconstruction.

Farsighted planning is key to a coordinated workflow and the success of a restoration.

Numerous variables may severely affect the cost and quality of the final outcome. The patient case below is intended to present our approach to accomplish an implant-supported maxillary restoration. Thorough pre-operative planning of the surgical and prosthetic treatment and the application of the resulting plan to a CAD/CAM-fabricated surgical template allowed us to effect a solution that satisfied all parties involved. This report focuses on the technical work involved in the implementation of a "Toronto bridge" – a screw-retained restoration on implants – involving the use of artificial teeth and the reconstruction of the gingiva with a gingiva-coloured lab composite.

Patient case

A 45-year-old male patient presented to the practice with severe periodontal, functional and esthetic deficiencies (Fig. 1). The situation was so desperate that complete extraction of the maxillary teeth was necessary. The mandible was also in severe need of treatment but the intervention was postponed to a later date for financial and psychological reasons.

Surgical phase

After completion of the initial review, the laboratory created a diagnostic wax-up to visualize the proposed esthetic, phonetic and functional results. The wax-up

Fig. 1 Pre-op situation: The patient presented at the practice with significant periodontal, functional and esthetic deficiencies.

Fig. 2 A CAD/CAM-fabricated surgical template facilitates the correct positioning of the implants.

was then used as a basis to plan the prosthetic part of the restoration and to create a radiopaque template. The template was worn by the patient during the subsequent X-raying process. The three-dimensional data gained from the radiographs and the pre-operative plan of the prosthetic restoration enabled the operator to determine the site of the surgical implant insertion pre-operatively by means of planning software. The CAD/CAM-fabricated surgical template resulting from this procedure facilitated the positioning of the implants during the surgical intervention (Fig. 2).

Prosthetic phase – framework fabrication

After the implantation had healed, the prosthetic work commenced. An implant model with a gingival mask was created (Fig. 3) and the correct bite was transferred to an articulator. As the shape, position and dimension of the prosthetic restoration had already been defined in the wax-up, only few more steps were required prior to creating a framework pattern (Fig. 4).

We checked the functional and esthetic aspects of the set-up and determined the framework design of the "tertiary structure". We used a key made of type IV plaster as a visual control while we were creating the framework pattern (Fig. 5). The support structure was made of a burn-out resin (Fig. 6) and incorporated all required parameters (structural stability, retention, space requirements).

Two methods are available for constructing the metal framework:

1. Conventional casting procedure
2. Digital fabrication with CAD/CAM technology

Fig. 3 The implant model with angulated secondary components

Fig. 4 Set-up in wax (esthetic and functional reconstruction)

Fig. 5 A plaster key was utilized to preserve the oral situation. This measure visualizes the spatial requirements for the framework.

Fig. 6 The tertiary structure was fabricated using a burn-out resin.

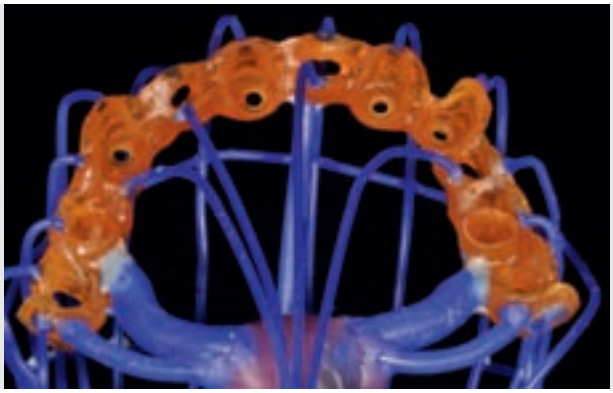


Fig. 7 Sprueing for the induction casting procedure

Fig. 8 The framework fits accurately on the secondary components.

Fig. 9 Opaque, gingiva-shaded acrylic resin was applied to specific areas.

Fig. 10 Application of the gingival materials

Which of the two will be used depends on several factors. The limitations of the current technology led us to opt for the conventional casting procedure (Fig. 7). We selected the Colado® CC alloy, which offers long-term stability for implant-supported restorations. Even if a "conventional" procedure is utilized, the framework should always be processed in line with the latest scientific and evidence-based indications (Fig. 8).

Prosthetic phase – completion

At the next stage, the veneering materials were applied. The fatigue strength and resistance of the framework can be increased by shot peening the surfaces in a carefully monitored process prior to applying the veneering materials. In addition, the surfaces were chemically pre-treated with an opaque pink-coloured paste from the new SR Nexco® range of lab composite materials to ensure a stable, durable bond. Another aim was, of course, to achieve a maximum level of adhesion to the prefabricated resin teeth. For this purpose, we conditioned the bonding surfaces according to the Instructions for Use of SR Nexco Paste and this allowed us to achieve an excellent chemical bond.

Procedure:
- Carefully sandblast the framework with Al_2O_3 at 2-3 bar (29-44 psi) pressure
- Remove blasting medium residues with oil-free air
- Apply a coating of SR Connect bonding agent and allow to react for three minutes
- Light-cure in a Lumamat® 100 furnace
- Make sure to leave the inhibition layer intact

The teeth were polymerized on the framework in line with the tooth set-up.

Opaque acrylic resin was applied to specific areas to provide a slight indentation (Fig. 9). In addition, this material diverts some of the masticatory forces from the teeth and thereby

Fig. 11 Careful completion of the composite restoration

Fig. 12 Basal view of the completed restoration

Figs 13 and 14 The natural looking lustrous surface finish of the SR Nexco composite and the surrounding gingival material support the invidualized esthetic effect.

Fig. 15 Completed prosthetic reconstruction: the restoration made of lab composite is esthetically pleasing and meets the functional requirements of the clinical situation.

increases the durability of the restoration. As an additional advantage, the amount of composite material required for the gingival area is reduced.

After the preparatory steps had been completed, the surface was masked with a layer of pink composite (SR Nexco Gingiva) followed by several more intense gingiva layers in various shades and opacities which were applied according to the procedure mentioned above. To achieve a harmonious and natural looking pink shade, possible discolorations were masked with Nexco Stains clear. This method allowed us to achieve the desired result relatively rapidly and straightforwardly (Fig. 10). After the gingiva had been completely reconstructed, the materials underwent final polymerization in a light furnace (Lumamat 100 / 11 minutes).

Overheating by rotating instruments should be avoided when reworking, finishing and polishing the restoration. This is particularly important for the transition between the framework and composite (Figs 11 and 12). The natural looking shiny surface finish of the materials completes the high-quality result (Figs 13 to 15). We checked the esthetics, phonetics and function of the prosthesis when inserting it in the patient's mouth. In this respect, we needed to bear in mind that the prosthetic reconstruction of the mandible should be carried out soon.

Recall

Restorative care and maintenance constitutes the last, but no less important stage in the treatment. Recalls were conducted first after 4 months and then after 6 months as part of the restorative care plan. Regular recalls serve the purpose of re-establishing and maintaining the biological, functional and esthetic aspects of the stomatognathic system in the long term.

I would like to thank Dr Ferdinando D'Avenia from Parma (Italy) for the clinical images.

Contact details:

Cesare Ferri
Via Avegno, 69
00165 Rome
Italy
cesareferri@hotmail.it

Precision-fit solution

Dental prosthesis with horizontally coupled structures
Justo Rubio, Valencia/Spain

Implant cases in which the initial situation is problematic pose a considerable esthetic challenge to the dental technician. In complex cases of this kind, a dental prosthesis with horizontally coupled structures has proved to deliver excellent results.

For many years, the esthetics of the dental restorations I fabricated was extremely dependent on factors related to the patient or the technique used. In order to avoid unsightly margins, cemented restorations were frequently preferred over screw-retained versions. However, the fact that the cemented restorations prevented the clinical inspection of the implant was considered to be a disadvantage of these solutions. Furthermore, the cemented implant restorations often did not provide labial support, which in turn resulted in their low patient acceptance.

Based on an analysis of the options that were available to me, I developed a new approach to solving this problem. It requires the fabrication of two denture structures that are coupled together by horizontally sliding the overdenture component on the primary denture attachment. I started using this method three years ago. In the meantime, it has gained considerable acceptance by dentists and patients alike.

The idea behind this approach stems from a solution, which I developed for cases involving unfavourable implant positions or difficult implant angles. Due to the good results that I have achieved with this method, I now also use it in Class III and II occlusions, since it allows me to shift the entire arch forwards or backwards as required (Figs 1 and 2). The issue of esthetics is paramount at all times.

From idea to implementation

Originally, I produced this type of denture with acrylic teeth. However, I have also started to produce crowns with IPS e.max® Press (lithium disilicate), which are subsequently cemented to the metal structure.

I would like to take this opportunity to describe a further case in which a horizontal slide-in denture was used in combination with IPS e.max Press. The anterior crowns were layered with IPS e.max Ceram and the posterior crowns were fabricated in full contour.

After a thorough analysis of the case at hand, the clinician in charge inserted eight implants in the upper jaw of the patient. Following the necessary preliminary work, acrylic teeth were also used in this case to set up the denture in order to establish the esthetics and dimensions of the primary structure. Based on this information, the primary structure was first modelled with resin and then milled from titanium (Figs 3 and 4). In other types of cases or due to economical reasons, this structure can be cast with a Co-Cr alloy.

Fig. 1 Example of a problematic case involving a Class III occlusion

Fig. 2 Denture set-up with acrylic teeth for determining the esthetics and dimensions of the primary structure

The primary denture attachment structure is designed in such a way that it allows the secondary overdenture component to slide in place over it. For this purpose, the occlusal surface of the primary structure has to be completely flat and parallel to the secondary structure. These conditions are requisite for coupling the structures. On both sides of the structure, parallel ridges of the same dimensions are created vertically to the occlusal surface in the premolar and molar region. The horizontal grooves in which the secondary structure slides into place are also located in this area.

Based on the initial tooth set-up, the secondary structure is first created in full contour with a machinable wax and then cut back as required. Subsequently, the corresponding structure is cast in metal (Figs 5 and 6).

In order to impart a highly esthetic appearance to the denture in this case, I removed the wax subgingivally until only 2 mm was left. Subsequently, the secondary structure was cast with retentive elements in the gingival zone (Fig. 7). As a result, the mechanical retention needed for the subsequent application of SR Adoro® Gingiva material was

Fig. 3 Creation of the primary structure with titanium using dedicated computer software

Fig. 4 The precision-fit structure on the model

Fig. 5 A full-contour secondary structure was fabricated with machinable wax ...

Fig. 6 ... and subsequently cut-back as required.

Fig. 7 The cast secondary structure with retentive elements in the gingival zone

Fig. 8 Structure with horizontal slide-in attachment

Fig. 9 The fully coupled structures

ensured. Furthermore, I used a denture attachment system rather than a conventional overdenture, as it distributes forces more evenly (Figs 8 and 9).

Completion of the restoration

Since I have extensive experience in using IPS e.max Press (lithium disilicate), I decided to use this material to veneer the metal structure in the present case.

Lithium disilicate combines excellence in esthetics, wear resistance and fracture toughness.

From the range of ingots offering various levels of opacity, I chose to use the LT ingots. Thereafter, I covered the vestibular and incisal areas of the anterior frameworks with IPS e.max Ceram. I fabricated the posterior teeth according to the full-contour technique and characterized them with the corresponding stains (Fig. 10).

I did not coat the palatal areas of the anterior teeth and left them in the lithium disilicate state (Fig. 11). As a result, their strength and monolithic shape was maintained in this area, which greatly helped in adjusting the occlusion and the centric position and the proper lateral and protrusive movements.

On the vestibular side, I used the cut-back technique in order to create space for the various IPS e.max Ceram Impulse materials, which impart the individualized esthetic appearance and life-like effects to the front teeth (Fig. 12). The interplay of the colours of the different materials was enhanced with this technique. After the crowns had been completed, they were cemented to the metal structure with Multilink® Automix. By using the same type of ingot in conjunction with the different working techniques, I was able to achieve excellent function and esthetics and save time and money to boot (Figs 13 and 14).

Fig. 10 Characterization of the posterior teeth

Fig. 11 Palatal view of the lithium disilicate tooth surfaces

Fig. 12 The vestibular surfaces were coated with IPS e.max Ceram.

Figs 13 and 14 Esthetic result achieved with IPS e.max Press crowns and SR Adoro Gingiva

Conclusion

This type of horizontal slide-in attachment offers the same advantages as a cemented restoration: This includes a highly esthetic appearance, invisible margins and the preservation of the entire occlusal surface. Moreover, the benefits of a screw-retained denture are also provided: for example, easy clinical repair and the possibility of removing the secondary structure to enable cleaning by the patient and if necessary adjustment by the dental laboratory. As a result, patients can enjoy the confidence offered by a fixed restoration that can be removed for oral hygiene purposes not only by their dentist but also by themselves.

The described technique enables me to overcome the esthetic challenges posed by difficult individual oral situations or implants with problematic positions. As I have received very positive feedback from dentists and patients alike, I now use this technique on a regular basis to solve cases, which according to my analysis, could not be resolved to the satisfaction of dentists and patients with normal procedures.

I would like to thank Dr José María Llorens Pastor from Alcoy for his collaboration on this case. I could not have written this article without his assistance.

Contact details:

Justo Rubio
Laboratorio Dental Justo Rubio
C/Roure Valenciá, 4 bajo
46014 Valencia
Spain
justorubio@modelamossonrisas.com

Analyzed, pressed and layered

Excellent esthetics due to skilfully combined materials
Gérald Ubassy, Rochefort du Gard/France

In the creation of a bright smile, a precise evaluation of esthetic and functional aspects is requisite.

A well-planned working protocol is an essential tool in the fabrication of dental restorations. We have developed a special approach in our dental laboratory. It is presented here on the basis of a case study. The restorative work involved the fabrication of six veneers for the anterior teeth.

Fig. 1 We carefully analyzed the initial situation, the tooth shapes and the morphology on the basis of the patient's portrait.

Fig. 2 This intraoral picture shows the severely worn anterior and posterior teeth.

Fig. 3 Minimally invasive treatment was planned for the upper anterior teeth. Merely the vestibular areas were prepared.

The analysis

In challenging cases the dental lab technician starts the restorative procedure by carefully analyzing all the available data: this includes photos of the initial situation, study models and a face-bow registration. The portrait picture of the patient alone provides important information for the dental technician. On the basis of this picture, we can carefully analyze the tooth shape and the facial parameters (morphology) and gain significant insight into how to approach the creation of an "esthetic smile" (Fig. 1). In this case, the intraoral images showed that the anterior and posterior teeth had been severely abraded (Fig. 2). The patient wished to be rid of these flaws and to regain the natural shape of his teeth.

After in-depth consultation with the dentist, the decision was taken to restore the affected teeth with all-ceramic veneers according to minimally invasive principles. As a preliminary step, orthodontic treatment was performed to move teeth 11, 12, 13, 21, 22, 23 towards the vestibular aspect and thus establish less traumatizing function. Then the vestibular surfaces of the upper front teeth were prepared (Fig. 3). We chose to produce the veneers with pressed ceramic, which we then proceeded to build up according to the individual requirements. I have been using this technique for many years. I fabricated the first restorations (IPS Empress®) in this way in 1992 [Shapes and shades, G. Ubassy, Quintessence Publishing Co.]. Next, IPS Empress 2 became my ceramic of choice. In the mean-

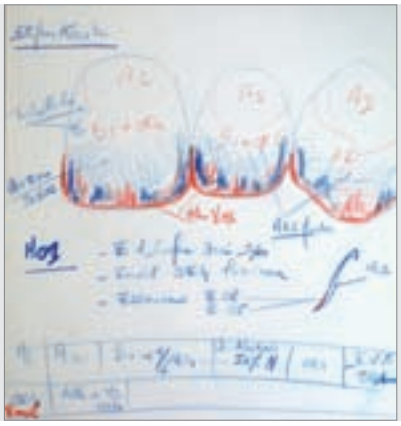


Fig. 4 A detailed layering scheme is essential in the esthetic reconstruction of anterior teeth.

Fig. 5 The pressed frameworks. The colour and opacity of the IPS e.max Press ingot used sufficiently masks the colour of the prepared tooth.

Fig. 6 After foundation firing, IPS e.max Ceram Essence materials were applied and ...

time, I use IPS e.max® Press (lithium disilicate glass-ceramic) exclusively for this purpose. In my opinion, this solution is ideal for fabricating restorations of this kind. Although the conventional layering technique using refractory models produces highly esthetic results, it is very time-consuming and demanding. The restoration has to be fired several times without the possibility of monitoring its colour in the process. In the technique that I use, however, a framework is pressed and then the incisal third is cut back. Thereafter, the dental technician "merely" has to apply the veneering ceramic. As a result, this procedure takes less time and the outcome is easier to control.

The layering scheme

In anterior restorations in particular, it is important to carefully match the colour saturation and the brightness. In most cases, several ceramic layers are required to achieve the appropriate blend. However, in the present minimally prepared case very little space was available for the veneer. I am sure that every dental technician is familiar with this scenario. In order to achieve a true-to-nature result nonetheless, a detailed layering scheme is indispensable (Fig. 4). In this case, I used two different IPS e.max Ceram Dentin materials: A3 and A2 as well as an additional lighter Dentin B1 mixed with 1/2 Opal Effect (OE 4) to increase the value.

As we all know, the incisal third of natural teeth is translucent. Therefore, in this part of the restoration, the Dentin material has to be "desaturated" with a "translucent neutral" material. The Opal Effect 1 (OE 1) material is indispensable due to its opalescent properties. It has a translucent blue appearance in reflected light and an amber tint in transmitted light. Consequently, we placed some OE 1 in the proximal corners and along the incisal edges. Natural teeth often have small areas on the edges, which absorb light. In the present case, these areas were imitated with a violet material (OE V) and 1/2 OE 1. I have given this mixture the descriptive name of "Absorption Material". As only limited space was available for the enamel material, I decided to use the bright OE 4. The layering technique presented above and my method for ensuring the correct shade as well as many other useful tricks are described in detail in my book entitled "Tips and hints" (Teamwork media srl).

Pressed and ...

The IPS e.max Press ingots are ideal for fabricating the frameworks of layered veneers. In the present case, my associate Florence Ozil pressed such a framework using an MO 1 ingot (framework thickness of 0.4 mm/0.5 mm) (Fig. 5). The colour and opacity of these ingots is optimal. The material satisfactorily masks the colour of the prepared tooth. At the same time, it is not excessively opaque.

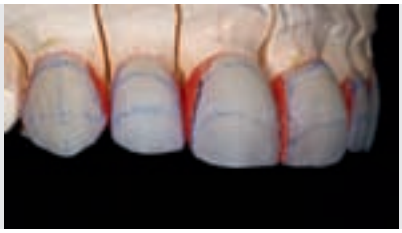
The broad range of IPS e.max ingots from Ivoclar Vivadent provides a suitable solution for almost any clinical situation: Due to the choice of various levels of opacity, translucency, brightness and fluorescence, even difficult cases can be successfully treated.

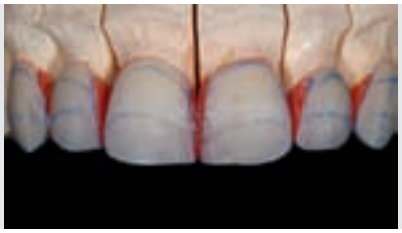
1. The MO 1 ingots mask the colour of the prepared tooth, but do not look opaque. We use these ingots for almost 70 percent of the crowns we fabricate.
2. MO 0 ingots are a good alternative for fabricating lighter crowns, in particular if patients want "brilliant white" teeth.
3. LT press ingots are suitable for clinical situations in which the prepared tooth has a light colour. Due to their translucent properties, these materials allow the preparation shade to shine through, which imparts a certain depth to the appearance of the restorations. I try not to use LT ingots in the fabrication of individual teeth, as their shade after seating is difficult to anticipate.
4. In addition, several more fluorescent press ingots are available today: IPS e.max Press Impulse Opal 1 and 2 as well as Impulse Value 1, 2 and 3. We use these materials from case to case.

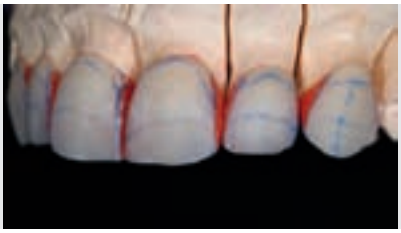
... then layered

After the pressing procedure, the frameworks were reduced to 0.3 mm and coated with a thin dentin layer (Fig. 5). Foundation firing at 750 °C preceded the layering procedure. After firing, the IPS e.max Ceram Essence materials were applied (Fig. 6). These working steps demand considerable expertise from the dental technician. As the framework (MO 1 ingot) in the present case masked strong colours, we had to ensure the adequate saturation of the cervical third. However, the space for the layering materials was limited. When faced with challenges such as these, the

Fig. 7 ... the ceramic layers were placed. Only one firing cycle was needed to achieve the desired result.







Figs 8 to 10 Finalization of the tooth shapes. The contours and angles of the teeth were marked with a bi-coloured wax crayon.

Essence materials provide a good alternative. These materials are fired at 725 °C. In the case described, the subsequent layers were completed in one firing cycle (Fig. 7). This economical procedure considerably reduces the work load and heightens the efficiency of the laboratory. The thickness of the veneers measured 0.5 mm in the middle third and 0.3 mm in the cervical third. The clinician deliberately prepared the incisal third of the teeth so that enough space was available for building up the ceramic layers and for creating all the fine details required in a natural-looking restoration.

Morphological design

In order to faithfully recreate the morphology of the teeth, we marked the contours and angle characteristics on the veneers with a bi-coloured wax crayon (Figs 8 to 10). This guided us in reproducing the tooth shapes efficiently and precisely. The use of this method, which I have taught for 18 years, allows high-quality results to be achieved.

At the beginning of their career in particular, it is important for dental lab technicians to study the different tooth shapes and shades.

We have a collection of several thousand natural teeth at our disposal. On the basis of these samples, we can analyze the shape and surface texture of teeth.

The completed restorations were 0.75 mm thick in the middle third: 0.3 mm for the framework and 0.45 mm for the veneering ceramic (Fig. 11). Despite the limited space available, we managed to recreate the tooth colour as we had planned. Figure 12 shows the high saturation of the restoration in the cervical third and enhanced luminosity in the middle third. The translucent effects (absorption areas) and reflective dentin

Fig. 11 The veneers measured a total thickness of 0.75 mm (middle third): 0.3 mm for the framework and 0.45 mm for the veneering ceramic.

Fig. 12 Despite the delicacy of the restorations, their saturation was satisfactorily high in the cervical third. Our strategy enabled us to impart luminosity to the middle third of the incisor teeth and reproduce the desired translucency.

Fig. 13 When we saw the results on the model, we already knew that the restoration would blend in seamlessly and naturally with the oral environment.

Fig. 14 The seated veneers confirmed the success of our well-planned approach.

Figs 15 and 16 After a period of several weeks, the restorations showed to be successfully integrated with regard to both periodontal and esthetic aspects.

Fig. 17 The patient is smiling again.

areas in the veneers are clearly discernible. When we examined the restorations on the model, we obtained a preliminary impression of what they would look like after their adhesive placement (Fig. 13). We carefully polished the lifelike surface we had achieved. The layering material was remarkably thin. Nevertheless, we managed to produce highly esthetic anterior restorations (Fig. 14). Furthermore, after several weeks in situ the restoration showed excellent results in terms of the periodontal considerations (Figs 15 and 16). Undoubtedly, this successful outcome is also due to the close collaboration of Dr Stefen Koubi from Marseille who was the clinician in charge of this case. Together we were able to restore the patient's smile. The tooth shapes correspond to the patient's personality and tooth morphology (Fig. 17).

Conclusion

In cases such as the one described, veneers represent an excellent treatment option. We achieved outstanding results with restorations involving pressed frameworks, which were subsequently built up with ceramic layers. This method is much easier than the conventional layering technique, but nevertheless provides optimum quality. Special thanks go to Dr Stefen Koubi from Marseille, France, for his great human and professional qualities.

Contact details:

Gérald Ubassy
Centre de Formation International
Route de Tavel – Impasse des Ormeaux
30650 Rochefort du Gard
France
contact@ubassy.com
www.ubassy.com
Follow me on Facebook.

Distinguished by innovation

Healthy teeth produce a radiant smile. We strive to achieve this goal on a daily basis. It inspires us to search for innovative, economic and esthetic solutions for direct filling procedures and the fabrication of indirect, fixed or removable restorations, so that you have quality products at your disposal to help people regain a beautiful smile.

www.ivoclarvivadent.com

Ivoclar Vivadent AG
Bendererstr. 2 | 9494 Schaan | Liechtenstein | Tel.: +423 / 235 35 35 | Fax: +423 / 235 33 60

648847

ivoclar vivadent®
passion vision innovation