

A route to esthetics

Oliver Brix¹ and Sergey Chikunov²

Abstract

A detailed analysis of the preoperative situation, a systematic interdisciplinary approach and suitable materials enable us to create restorations in harmony with the surrounding natural dentition.

The custom-tailored fabrication of tooth replacements leads to highly esthetic restorations that blend in harmoniously with the natural surroundings. Machinery and software may assist us in achieving these results. In the final analysis, however, it is the human factor and the notion that every patient case is unique that determine the outcome.

Many aspects must be taken into account to meet the requirements of patients, or to satisfy the expectations created in them. Manufacturing a standard dental replacement or producing a copy of the natural tooth will not be sufficient. The idea of "symmetry" is a fallacy. Instead, we should strive for "harmony". To achieve this goal, a holistic approach and an understanding of the complex stomatognathic system are required.

¹ Oliver Brix, Bad Homburg/Germany

² Dr Sergey Chikunov, Moscow/Russia

Contact Details:

Oliver Brix, innovative dental design Oliver Brix
Kisseleffstrasse 1a, 61348 Bad Homburg, Germany
Oliver-Brix@t-online.de

Dr Sergey Chikunov
2, Gukovskogo, pl-2, 103062 Moscow, Russia
sergey.chikunov@gmail.com

Thoughts on achieving harmony with "pink" esthetics

The gingival architecture plays a considerable part in an esthetic reconstruction. No matter how beautifully layered, a crown will not meet the criteria of esthetics if the surrounding gingival tissues are inadequate. We can only achieve harmony if the restoration is embedded in a "pink" frame of healthy gingival tissue. For this purpose, it is necessary to cooperate closely and communicate systematically as early as in the pre-prosthetic planning phase.

Thoughts on "white" esthetics

As a matter of fact, we embark on the path towards esthetics at a much earlier stage than we think. The moment we learn about the design and structure of the natural tooth, we have taken a large step forwards. A cross-section of the tooth helps us to interpret its natural characteristics. By looking at the interior of the tooth, we obtain a great deal of information about its "white" esthetics. Revealing though our findings may appear, we may be frustrated by the realization that we will never be able to copy nature. However, this statement is not intended to be discouraging – to the contrary: Let's be inspired by nature. Advanced, all-ceramic systems enable us to create restorations that resemble the "natural tooth" very faithfully.



Figure 1: Preoperative situation: The young patient was unhappy about the appearance of her anterior restorations.



Figure 2: The teeth were noticeably overcontoured. They looked unduly large and bulky. We decided to rebuild them.

Thoughts on the material

In our laboratory, we have been using the IPS e.max® allceramic system for many years. This system presents a “whole dental world on its own”, offering a comprehensive range of indications ranging from occlusal veneers, inlays and onlays to complex implant-supported reconstructions.

Why use all-ceramics? If we look again at the cross-section of the natural tooth, we will obtain the clues to answer this question. For instance, we can see the interplay between light and dentin. Natural teeth impress with their ability to interact with light. Tooth colour is determined by the lightscattering properties of the dental tissues. The optical properties of the different structures combine in complex processes (reflection, diffusion, fluorescence, opalescence, etc.) to form an overall impression. Our goal is to incorporate this interplay into the reconstruction of the tooth. In our opinion, this is only possible with all-ceramic materials.

The concept

Interpreting the light optical properties is a prerequisite for selecting appropriate materials. The foundation for the result is laid down with the framework, whose shade can be modified according to the initial situation. The accompanying layering ceramics (IPS e.max Ceram) and our skills enable us to achieve true-to-nature imitations of the natural tooth structure. We can create a “tooth” that conveys vitality and promises long lasting esthetics because of its homogeneous surface.

Like for most of our patients, we have employed pressed ceramic restorations (IPS e.max Press) for the case described below. In this respect, it should be noted that the vast range of different ingots is not intended to confuse you. The range of shades is well thought out and reflects the above knowledge about the optical properties of teeth. For instance, translucency and opacity have opposing effects –

low-opacity ingots result in a high degree of translucency while high-opacity ingots provide a low degree of translucency. Translucent ingots demonstrate limited masking capabilities – a property that needs to be taken into account in conjunction with discoloured preparations in particular.

The layering pattern affects the colour and brightness values by approx. 40 per cent only. Analysing the shade of the tooth preparation therefore presents a vital part. Likewise, dental technicians should know “their” ingots and the associated optical properties. A custom-made key ring may be of invaluable assistance in this respect.

Presentation of a typical patient case

The patient case described below presents a “dental fairy tale”. It tells the story of a young woman who turned from a “duckling” into a beautiful “swan”.

Examination and planning

The patient visited the practice because of esthetic concerns. She was unhappy about the appearance of her upper anterior restorations. An analysis of the preoperative situation provided the foundation for the further treatment in line with our principles. Generally, a portrait picture is ideal to assess the overall impression and detect disharmonies. Assessment is performed using the known reference lines. The shortcomings were easy to spot on the preoperative pictures of the patient (Figures 1 and 2). The crowns were grossly overcontoured and looked bulky.

We prefer a manual approach for treatment planning. Reconstruction of a patient case is impossible without a wax-up. The patient’s requests and esthetic improvements were all integrated into the wax-up, which was then submitted to the operator as treatment proposal. We need to be aware of the fact that the vision we have as dental technicians does



Figure 3: The gingival line had to be optimized. The picture shows the situation a few days after surgical crown lengthening.



Figures 4 and 5: Removal of the existing restorations. The preparation was slightly recontoured according to the indications of the wax-up. The soft tissues offered ideal conditions.



Figure 6: The tooth shade was communicated with photos. Black and white pictures enable the dental technician to determine the brightness value and dentin shade.

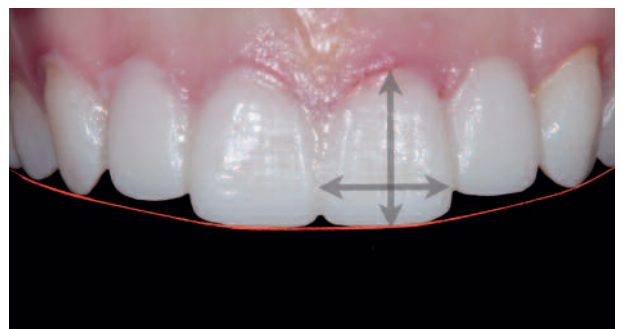


Figure 7: The temporary was fabricated chairside with a vacuumformed tray. The esthetic improvements were visible.

not always tally with the expectations of the patient, who, first and foremost, does not want to experience too much pain.

Together, the initial situation was discussed and surgical crown lengthening was proposed. The gingival line is essential to achieve a harmonious effect, or an ideal proportion between width and height. Figure 3 shows the situation after soft tissue contouring. The wax-up was duplicated and cast in stone. The stone cast was used to discuss the treatment from a three-dimensional perspective.

After all parties involved in the treatment were satisfied, a "template" was created.

Mock-up

In this case, the template consisted of a vacuum-formed tray made of flexible material (1.5 mm) and this template was used to produce the mock-up. The operator was able to assess the planned treatment in the oral cavity and to adjust the preparation, taking into account the clinical parameters. As a result, the necessary space was created at



Figure 8: The temporary restoration allows all parameters to be checked and adjusted chairside.



Figure 9: The effect of the restoration in the facial environment – harmonious relation to the lips and smile line.

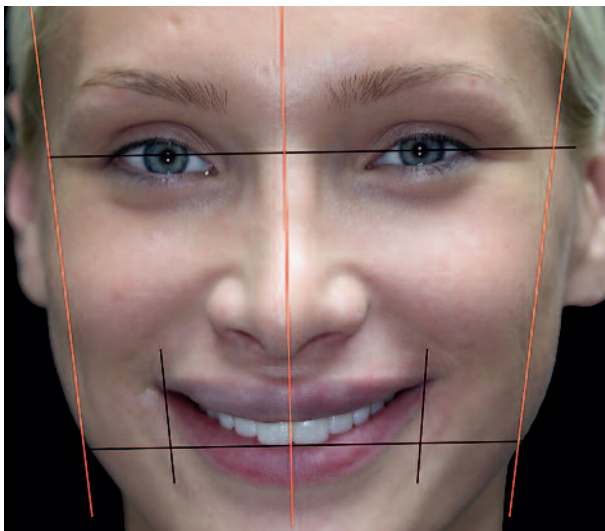


Figure 10: An additional check using the facial reference lines.

the “right” place (Figures 4 and 5). At the time of the preparation, the soft tissues were in a healthy condition, providing an ideal frame for the “white” esthetics of the restoration. Pictures were used for shade communication. Black and white images assisted in determining the brightness value and dentin shade (Figure 6).

The template was also of valuable help in the temporization procedure. The temporary restoration was effectively fabricated and inserted using a composite material (Telio® CS C&B). An immediate improvement was observed to the satisfaction of everybody. Figure 7 shows the amendments in toto and provides a preview of the envisaged result. At this stage, all parameters (shape, function, phonetics, etc.) were checked again (Figure 8). Intraoral corrections may be easily performed and do not necessarily require the involvement of a dental technician. Again, the most important impression was the facial environment (Figure 9). A harmonious relation to the lips and smile line was achieved. An additional check was carried out on a new portray picture with reference lines, showing any

corrections that may be taken into account in the final restoration (Figure 10).

Completion

The working model indicates the scope of restoration work required (Figure 11). A silicone key was used to evaluate the material options (Figure 12). To make the right choice we need to have a clear idea of the space available for the restoration. The silicone key allows us to establish the exact amount of space and to decide whether we can utilize translucent materials, retain the shade or even use materials with increased opacity. We opted for the IPS e.max Press ingot MO 0 in this case. The copings were subsequently veneered with the respective IPS e.max Ceram layering materials. From this, it was only a small step to fabricate the final restoration. All parameters were established. The result is the logical consequence of the quality of the preliminary work (Figure 13).

To avoid an additional try-in on the patient, the correlation of the wax-up and the temporary was checked by means of the silicone key. In this case, everything went according to plan. We forwarded the all-ceramic single crowns to the practice with a feeling of having done the job well.

The restorations were seated according to the guidelines using a rubber dam. Composite materials are subject to oxygen inhibition, which means that the layer of material which is in contact with air during polymerization does not cure properly. To prevent this effect, all preparation margins were covered with glycerine gel (Liquid Strip). Then, the ceramic restorations were seated in the mouth step by step using Variolink® II.

Figure 14 shows the result. The details come together as a whole to create a harmonious impression and the restoration blends in seamlessly. This is testimony to an all-ceramic restoration that was created with loving attention to detail (Figure 15). The “miracle” has been accomplished – the patient turned into a “swan” and was elected Miss



Figure 11: The scope of the restoration work is visible on the working model.



Figure 12: The silicone key was used to establish which materials may be used for the restoration.

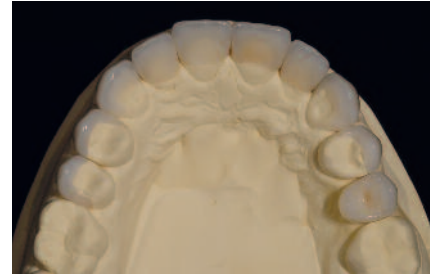


Figure 13: Completed restoration on the model.

Russia in 2010 (Figure 16). Such visible evidence of dental art is part of the most beautiful moments in our professional lives. Sometimes, the miracle continues: in 2011 our patient was crowned Miss Globe. Can you ask for more?

Conclusion

Advanced manufacturing techniques form the basis for allceramic restorations. The range of options available allows us to achieve highly esthetic results effectively. The combined skills of the dental technician and dentist enable the creation of tailor-made restorations. The first steps towards an esthetic restoration are taken as early as at the first consultation appointment with the patient and continue with a comprehensive analysis and careful treatment planning.

This is a well-established route, which, however, does not mean that there is no room for creativity. Our understanding

of the stomatognathic system and our material knowledge complement our creativity and skills.



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This case has also been published in a book titled "Fascination All Ceramics": 250 pages, 1,250 photographs, € 150. Available in German, English, Italian and Spanish. To order a copy, contact: asselmann@teamwork-media.com

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Figures 14 to 16 Result of our efforts. The details come together to form a consistent whole and the restoration blends in harmoniously.