Team players: function and esthetics

A systematic approach to full-mouth rehabilitation with all-ceramics

IPS e.max Smile Award 2016: The following article describes the complex full-mouth rehabilitation of a female patient who consulted our practice because she was dissatisfied with the appearance of her smile. A reliable and efficient approach made the most of the interplay of esthetics and function and all-ceramic materials.

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Esthetics and function – these two requirements are inseparable in restorative dentistry. The case outlined in this article highlights just how tightly these two aspects are connected. The patient primarily wanted the treatment to enhance her appearance. The dental team, however, could not fulfil these esthetic demands without taking into account the functional considerations. Their aim from the time of the treatment planning stage was to achieve a harmonious result. The extensive prosthetic work required a systematic treatment approach.

Case presentation

The young female patient consulted our dental practice about a smile enhancement. Her upper and lower anterior teeth were severely abraded and stained (Fig. 1). Moreover, she had received inadequate restorations in the past. The metal-reinforced bridges in the posterior region did not provide suitable function and esthetics. The patient was dissatisfied with the entire situation (Fig. 2). The unesthetic appearance of her teeth was an embarrassment to her, especially when she smiled.

Diagnosis and planning

The first general diagnosis was based on the needs of the patient. Furthermore, specific aspects of the situation were assessed. A corresponding diagnosis was made and the patient was presented with a preliminary treatment plan. In accordance with our protocol, the plan focused on attaining a satisfactory balance between the functional and esthetic requirements. Furthermore, mainly additive measures were planned, which would make the treatment minimally invasive. The clinical diagnosis revealed the extent of the damage. Severe abrasion had considerably shortened the front teeth, which showed well-defined wear facets. The vertical dimension of occlusion was clearly too low. The patient’s smile line was not ideal and therefore, it negatively impacted her expression. The patient was in good general health. She did not complain of any temporomandibular joint pain or of tight jaw muscles. In the development of the final treatment plan, we first concentrated on the functional requirements. In the process, we established that the vertical dimension of occlusion needed to be raised by one millimetre and a new occlusal scheme created. Therefore, we proposed the following steps: stabilize the situation with the help of long-term temporaries before starting the prosthetic treatment; place two implants to close the gaps left by the loss of tooth 46 and 36; restore the dentition with all-ceramic crowns, bridges and veneers (IPS e.max Press, Ivoclar Vivadent) and provide the patient with a bite guard to protect the teeth after the treatment. The patient agreed to this plan.

Prosthetic pretreatment

Portrait pictures and video clips showing the patient when she is speaking and smiling constituted important diagnostic tools in the treatment process. They provided us with valuable information for the design of the diagnostic wax-up. Impressions were taken for the fabrication of the models. A facebow record was taken for the skull-related transfer of the situation into the articula-
required only light preparation. The upper anterior teeth were prepared for 360° veneers and the lower anterior teeth for ultra-thin veneers (Fig. 8). We pursued a minimally invasive strategy, which was quite easy to implement due to the additive approach of the treatment plan. An impression of the situation was taken based on the mock-up, long-term composite resin temporaries (Tealo Lab, Ivoclar Vivadent) were fabricated. During the next three months, the patient was able to accustom herself to the new conditions. She was given the possibility to test the new vertical dimension of occlusion and inform us about any esthetic and functional needs.

Permanent prosthetic restorations

The patient had no trouble adjusting to the new situation. She eagerly anticipated the placement of the permanent restorations. At this stage, she emphasized her requirements again: beautiful and above all light teeth. We decided to create the veneers with the press technique using a very light material (IPS e.max Press, HT Bl. 3). The copings for the crowns in the upper and lower jaw were fabricated with the press technique (IPS e.max Press, LT Bl. 3) and they were individually veneered (IPS e.max Ceram). The long-term temporaries served as a template. The restorations were produced according to the established protocol. The requirements of both function and esthetics were fulfilled. As requested according to the established protocol. The requirements of both function and esthetics were fulfilled. As requested.

Phonetic criteria were also checked in the process. Finally, some esthetic details were discussed (Fig. 7). The patient asked for light teeth and bold tooth shapes.

Implant insertion and preparation

The prosthetic restorations in the lower jaw were removed and implants were placed in the gaps left by tooth 46 and 36. The wounds took about three months to heal. Following the osseointegration of the implants and the conditioning of the soft tissue, the teeth were prepared for receiving the prosthetic restorations. The premolars and molars were given a bold shape. The surface of the ceramic was imparted with a distinctive micro and macro-texture, which produced a play of light similar to that of natural teeth (Figs 9 and 10).

Placement of the restorations

In preparation for the adhesive cementation of the restorations, the provisional crowns were removed and the teeth were cleaned. The anterior restorations were checked in the mouth using a try-in paste and the esthetic results were subsequently assessed. The occlusion was checked in detail.

Next, the ceramic restorations were etched with 5% hydrofluoric acid for 20 seconds. They were cleaned in an ultrasonic bath and dried. Their contact surfaces were silanized (Monobond Plus). Thermafer, a bonding agent (Heliobond) was applied. The individual ceramic components were temporarily stored in a container which protected them from light and contamination. Then the teeth were conditioned. A rubber dam was placed and the teeth were carefully air-abraded with aluminum oxide (0.50 microns). Subsequently, phosphoric acid gel (37%) was applied and thoroughly rinsed off after a reaction time of 30 to 40 seconds. The preparations were dried to the extent that a slightly moist shimmering dentin surface was visible. The application of the bonding agent (Syn tac) followed. The restorations were placed with the light-curing luting composite Variolink Veneer (Ivoclar Vivadent). The veneers of the two central incisors were seated and their fit was checked. Then one restoration after the other was placed on both sides. Before the restorations were light cured for the last time, the margins were coated with glycerine gel to prevent the formation of an inhibition layer. We removed excess with fine diamonds and polishers and then we polished and smoothed the margins. After the final examination, we checked the esthetic and functional parameters in particular (Figs 11 and 12). We provided the patient with a protective bite guard and then released her from the practice.

Result

Esthetic results that work. The all-ceramic restorations look completely natural in the patient’s face. Her facial expression has completely changed. The young woman appears relaxed and enjoying her new smile (Fig. 13). The first recall examination took place three days after the restorations were placed. At that stage, the condition of the soft tissue was excellent. It had fully adapted to the ceramic surfaces (Figs 14 and 15). The success of the treatment was confirmed after the six-month trial and the twelve-month recall (Fig. 16).

Conclusion

Sound functional principles, excellent esthetic design skills and an outstanding materials system teamed up to fulfill the patient’s ardent wish for a smile makeover. The restorations have given her new zest for life and they have improved her health at the same time.

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Full range of product offering for dental technicians at Dentsply Sirona

By Dentsply Sirona

As the world’s largest manufacturer of dental products, Dentsply Sirona has a variety of intelligent solutions that have been developed to meet the requirements of dental laboratories. Thanks to the combined power of the business units Dentsply Sirona CAD/CAM, Dentsply Sirona Prosthetics and Dentsply Sirona Implants, these solutions include both materials and devices for conventional manufacturing procedures and materials as well as hardware and software solutions for digital work processes. This results in a decisive advantage for dental technicians. At Dentsply Sirona, dental technicians can find the entire world of dental technology under one roof, and can take advantage of products and workflows that have been coordinated with each other.

As one of the central subjects in the area of modern dental technology, CAD/CAM-supported production of dental restorations for the laboratory is playing an even more important role. With its three business units – CAD/CAM, Prosthetics and Implants – focusing on dental technology, Dentsply Sirona possesses concentrated competence in dental treatment that can help to carry all steps within this production process. This brings clear added value to the dental laboratory as it combines specialists for the digital workflow and the inhouse production of restorations. One for dental materials and one for the centralized fabrication of abutments and implant-supported structures. In this way the whole process from impression taking to the final restoration can be handled with products from Dentsply Sirona – while still allowing for the freedom to include components from other open CAD/CAM systems. In all branches of dental technology, Dentsply Sirona’s innovation leadership is a benefit to the lab.

Software updates for new possibilities

The current software updates in Lab CAD SW 16.0 and inLab CAM SW 16.0 are perfect examples of such possibilities. They expand the range of indications and provide new functions for an even more efficient computer-aided production process that is oriented towards dental requirements. Now, for the first time, occlusal splints and individual impression trays can be designed with the inLab software via the new plugin inLab Split in the “Remo- wers’” module. The new inLab Check plug-in is being used in dentistry for the first time. The program supports the user via the FEM analysis of the restorations designed for critical stress-sensitive areas, and visualizes them. With screw-retained bridges and bars at the implant level, there is an additional indication that makes the immediate synergy effect with the central production service Atlantis from Dentsply Sirona useful for the laboratory for the first time. With the accurate infoX scanner and the Atlantis FPD 5.0 body, inLab SW users can scan cases from all major implant systems for ordering of Atlantis structures. Additional new production possibilities arise from the manufacturing of one piece individual titanium abutments with the inLab MC X5 milling unit. The STL+MAX import function for implant restorations with screw channels from other CAD software has been expanded to include the current inLab CAM SW 16.0.

New opportunities with Atlantis solutions

The Atlantis solutions line offers a range of digital services that are continuously developed. The possibility to order Atlantis abutments and Atlantis suprastructures via the Dentsply Sirona lab-design software creates new opportunities for the dental laboratory to offer more implant-based restorations to the dentist. The latest innovation from Atlantis is the Atlantis CustomBase solution for single tooth screw-retained restorations. It combines an Atlantis Abutment and an Atlantis Crown with a screw access hole. The crown is cemented to the abutment extracorally and screw-retained into the implant, avoiding potential complications caused by excess cement. The Atlantis Crown can be ordered as a physical crown or as a digital unique file.

The digital file is either a “ready-to-null crown” that can be imported directly into the inLab-CAM SW or an Atlantis Core File. This file includes the abutment designed by Atlantis, which can be used by the lab team as the basis for their own crown design. The Atlantis CustomBase solution is available in 98 mm sized titanium abutments and is also available for all major implant systems.

In addition, the Atlantis patient-specific suprastructure has state-of-the-art design software and additive manufacturing of titanium and cobalt-chrome implant-retained fixed restorations.

High performance materials for new materials

Materials are also a part of the range of products from Dentsply Sirona, along with the new denture base material Lutestine HPFA (High imp. porc acryl that is being pre- sented at the IDS. This new denture base material offers extraordinarily high strength, color stability and fit- ting accuracy. At the same time, the material specialist also has a new development in the area of zirconia ready for the ceramic sector: Cercon x5 with a level of translucency that is around 10% higher than that of Cer- con x1. Cercon x5 provides the dental laboratory with an even better level of esthetics, particularly for monolithic restorations. True-Coll Technology ensures a pronounced level of color reliability and reproducibility. As was the case with the Cercon ht, the Cercon x5 blanks are available in pre-colored variants in the classic 16 VITA colors and in white. Thanks to the standard format (98 mm disks), the new material can be used in all common open CAD/CAM systems, and is also available as a 35 mm disk for processing in the brain expert and brain expert milling units.

Here, the benefits of the combined level of dental expertise that Dentsply Sirona possesses come into ef- fect. Along with high-performance materials such as Cercon, with the 5-axis milling unit inLab MC X5, the company can also provide a ma- chine that can be used to process standard disks. This production unit is also compatible with an additional new material option for the digital workflow the sintering metal disk inCorta. New dental tech- nicians the option to mill using non- precious metals in their laboratory’s own inLab MC X5. Here, the expan- sion of the range of indications to include long-span work, across four units in particular has shown itself to provide added value. As a result, an ever larger number of cases can be handled using this processing method that is quicker, cleaner and more cost-effective in comparison to the casting method.

Conventional procedures, new chances

But the path of progress does not necessarily always move from analog towards digital. Using the example of an additional ceramic innovation from Dentsply Sirona, i.e. Celtra Press, it is clear that benefits for the dental laboratory can equally result from a contrary development. This is actually a material version of the zirconia-reinforced lithium silicate (ZLS) Celtra Duo that had been developed for CAD/CAM processing. As the name suggests, Celtra Press is now suitable for the traditional press method. Hence the benefits of the special micro-structure of ZLS can now also be used in this processing method that is used in nearly every laboratory. This includes a particu- larly high strength of over 500 MPa as well as outstanding mechanical and light-optical properties that in particular achieve a profoundly near-natural chameleon effect. The system components that have been specially matched with the new ma- terial ensure rapid processing and outstanding results when using Cel- tra Press. The Celtra Press investment material is partially responsible for the fact that only a minimal mation layer is formed during pressing, and this layer is removed by sandblasting during drying. The Celtra Ceram veneering ceramic is available to the laboratory for esthetic individualization.

In addition to this variety of interest- ing new products, Dentsply Sirona’s range of products of course also in- cludes just as many long established materials and hardware and soft- ware solutions. They allow the labo- ratory to benefit from workflows and products that have been coordinated with each other with a particularly wide range of indications.

Due to various certifi- cation and registration periods, not all prod- ucts are immediately available in all coun- tries.

References

1 For details see the Atlantis implant compa- rity charts:

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