Minimally invasive prosthetic treatment with various ceramic materials

By Dr Marko Jakovac, Croatia, and Michele Temperani, Italy

In cases where a full mouth reconstruction is required, it is essential to follow a systematic procedure and use carefully coordinated materials. The following case study describes the treatment of a patient with tooth agenesis.

New materials and innovative techniques for modern esthetic and minimally invasive dentistry are coming to the market every day. As a result, patient-focused treatment protocols are continuously improving. If complex treatment is indicated, however, personal aspects in addition to the functional and esthetic requirements of the patient need to be addressed – for example, psychological stress or financial constraints. In this article, we will explore the possibilities of providing minimally invasive treatment, taking these factors into consideration.

Case study

The twenty-three-year-old patient showed severe hypodontia (tooth agenesis) with a total of 14 missing teeth (Fig. 1). Seven teeth were missing in both the upper and lower jaw. Severe hypodontia of this kind usually results in a very low vertical dimension of occlusion. In some cases, it disturbs the chewing function. At the beginning of this type of treatment, psychosocial aspects have to be taken into consideration. In the present case, the patient did not smile during the first appointment, and he covered his mouth with his hand when he spoke. Due to the financial constraints of the young candidate and his fear of an operative intervention (treatment with implants), it was decided to pursue a conventional prosthetic treatment approach. According to the treatment plan, the upper anterior teeth would be restored by means of an all-ceramic bridge and the lower anterior teeth with lithium disilicate veneers. The decision was taken to treat the posterior teeth with metal-ceramic restorations.

Fig. 1: Patient with hypodontia: portrait picture of the initial situation. A total of fourteen teeth were missing in the upper and lower jaw.

Fig. 2: Anterior Lucia jig for the evaluation of the centric relation

Fig. 3: Capturing a protrusive bite record with Virtual CAD/Cam
Clinical examination and treatment planning

The first part of the oral rehabilitation process involved a clinical examination in which the facial and dental conditions were analyzed. This investigation showed a substantially reduced vertical dimension of occlusion. The patient was missing 14 permanent teeth. Furthermore, several deciduous teeth were still in place. Tooth 36 had been destroyed by caries, making its extraction inevitable.

In order to provide the dental technician with the information required for waxing up a restoration, details related to the vertical dimension of occlusion and facebow records must be supplied in addition to the impression. If the vertical dimension of occlusion needs to be increased, the correct centric position has to be evaluated first. In this case, an anterior Lucia jig made of a thermoplastic material was used as a registration aid (Fig. 2). A facebow was used to establish the relationship of the maxillary jaw to the horizontal reference plane or bipupillary line. In the fabrication of extensive restorations, the protrusive and the laterotrusive positions have to be recorded in order to make any necessary adjustments.

Fig. 4: Wax-up: ideal functional and esthetic position and adjustments for maxillary and mandibular incisal edges. The wax-up was carefully digitized with a digital impression scanner.

Fig. 5: Mock-up fabricated with the help of the wax-up for the intraoral examination of the functional and esthetic components. The mock-up provides a framework for the fabrication of the provisionals.

Fig. 6: The prepared upper anterior teeth

Fig. 7: The prepared lower anterior teeth

Fabrication of the permanent restoration

The final prosthesis phase started after the long-term temporary had been worn for an adequate period of time. Before impression-taking, the teeth were prepared again and polished. It is very important to transfer the vertical dimension of occlusion and the information about the tooth-to-tooth relationship from the provisional to the final restoration with great care. The “cross-mounting” technique is suitable for this purpose. This method entails first making a bite record of the prepared teeth in the upper and lower jaw. Subsequently, a second record is taken of the provisional restoration in the upper jaw and the prepared teeth in the lower jaw. A third record is captured of the prepared teeth in the upper jaw and the provisional restoration in the lower jaw.

The dental technician required the following minimum information in order to fabricate the restoration: precision impressions of the upper and lower jaw, precision impressions of the provisionals, a facebow transfer record and three bite records (cross-mounting), and the recent trait pictures of the patient wearing the provisionals as well as photos of the patient smiling.

The aim at this stage was to “copy” the shape and occlusal plane of the provisionals and to accurately transfer this information to the final restoration. For this purpose, the master casts were placed in a cofferdam and a carefree finisher after the “cross-mounting” process. Since the final situation had been successively attained by means of the provisionals, the frameworks could be fabricated relatively easily.

As a result of using the CAD/CAM approach, the final restoration could be visualized, modified and/or duplicated with the assurance that all the design guidelines would be observed. The Wisconsin Precision Technology (WPT, Naturns, Italy) milling centre was responsible for fabricating the frameworks for the permanent ceramic restorations in the posterior region as well as the zirconium oxide framework for the upper anterior teeth (Fig. 9). The framework was then used as a test object or blueprint during the healing period. Its function and esthetics were closely examined and adjusted in detail (Fig. 8).

As a result of using the CAD/CAM approach, the final restoration could be visualized, modified and/or duplicated with the assurance that all the design guidelines would be observed. The Wisconsin Precision Technology (WPT, Naturns, Italy) milling centre was responsible for fabricating the frameworks for the metal-ceramic restorations in the posterior region as well as the zirconium oxide framework for the upper anterior teeth (Fig. 9). The framework was then used as a test object or blueprint during the healing period. Its function and esthetics were closely examined and adjusted in detail (Fig. 8).

Conclusion

In extensive cases, it is particularly important to develop a well-thought-out plan including all the treatment steps, which needs to be carefully followed at all times. In the described case, various ceramic materials were cleverly combined to produce a harmonious result. Excellent communication between the dentist and the dental technician together with well-coordinated state-of-the-art materials provided the basis for this highly satisfactory outcome.

Dr. Zdenko Jakovac
clinical advisor
Department of Fixed Prosthodontics
School of Dental Medicine
University of Zagreb
Gunduliceva 5
1000 Zagreb, Croatia
jakovac@ffdf.hr

Michele Temperani
Dental Tribune Middle East & Africa Edition | 5/2016
3Shape CAD/CAM in a major Dental Lab

It was the technicians’ choice

By 3Shape

The versatility and solution coverage offered by 3Shape systems has enabled Glidewell to grow and develop well ahead of its competition by continuously expanding the range of its products and services. Now all types of restorations and large orders are handled digitally each day, with over 50 of 3Shape’s installations covering every Glidewell department need.

The Results

It has become clear to Glidewell that their 3Shape solutions are a major factor in enhancing their business, and they credit this to the system’s accuracy, consistency, predictability, and reproducibility of output. Many incoming orders explicitly express the condition that they are to be executed using Glidewell’s 3Shape systems.

The accuracy of the 3Shape system enabled Glidewell to introduce a highly successful product that are enjoying explosive market growth. BruxZir® full Zirconia restorations and Inclusive® Implant Abutment applications. No other CAD/CAM solution contained the powerful design capabilities necessary to morph the system’s full contour required. Designs made with 3Shape could be milled directly without flaws – thus opening windows to new productivity and profitability with Zirconia material.

By 3Shape

The versatility and solution coverage offered by 3Shape systems has enabled Glidewell to grow and develop well ahead of its competition by continuously expanding the range of its products and services. Now all types of restorations and large orders are handled digitally each day, with over 50 of 3Shape’s installations covering every Glidewell department need.

The Challenge

Glidewell’s proclaimed ambition is to be a pioneer in the Digital Dentistry Revolution, and, to achieve this, they know they must work with the best systems. Investing in a single CAD/CAM brand was not the important issue for them. Glidewell simply wanted to use best-of-breed systems for each service they provided.

With a dampened mood in the economy, more and more small and mid-sized laboratories were looking for sources of digital technology services in order to remain competitive, and this opened new business opportunities for full-service labs like Glidewell. More than ever, it became imperative to have fast and productive systems that could provide attractive digital services and products of high quality.

Glidewell develops their own systems and methods for many applications, including abutments, implants, milling and special materials, and they required flexible and highly versatile software systems to support these. They needed a system that was not limited – a system that could grow with them, ensuring that they could continue bringing their in-house developed products to the market while broadening their range of services.

The Solution

Glidewell initiated a technology solution business plan whose goal was to become familiar with the market’s flexible CAD/CAM systems. 3Shape was one of the first to present itself, but other brands were installed later, and Glidewell technicians soon became familiar with operating a wide range of systems.

Despite Glidewell’s readiness to employ best systems for different purposes, 3Shape accuracy, ease of use and efficiency continued to win preference in every department. Alternative 3D scanners and software systems were simply being pushed aside to make room for 3Shape. Glidewell’s dental technicians “at the bench” slowly but surely gravitated to 3Shape’s solutions for most of their tasks.

Today, Glidewell Laboratories has over 50 3Shape DentalSystem” and D500 series scanner installations spread throughout the full areas of Glidewell’s many departments. In step with the ever-increasing integration of 3Shape into their workflows, Glidewell has instituted convenient on-line services for other Dental labs using 3Shape, enabling them to upload their 3Shape scans or design files direct to Glidewell for special processing and production with Glidewell’s own materials.

The Flexibility of 3Shape as a system and a company fit perfectly with Glidewell’s goal to help pioneer the growth of digital dentistry. Glidewell’s technicians continuously communicate with 3Shape, giving feedback regarding their daily challenges, and often seeing direct solution answers in later 3Shape software releases.

Source: Greg Minzenmayer, Robin Bartolo, Rudy Ramirez

inLab MC X5: DENTAL LAB FREEDOM OF CHOICE.

Experience new freedom in your lab processes. Breaking the chains of former dependencies with inLab and the new 5 axis milling and grinding unit inLab MC X5. Open for all restoration data, combining the largest material range and the possibility to machine both wet and dry disks and blocks for no limitations to your production. Enjoy every day with Sirona.

INLABMCX5.COM
The Dental Company