A good option for the lifelike recreation of gingival tissue

The flawless reconstruction of gingival tissue requires sound teamwork as well as excellent materials and exceptional skill. Layering with the light-curing laboratory composite SR Nexco takes this procedure to a new level.

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Careful planning is indispensable in the treatment of an edentulous jaw with implant-supported restorations. The axes and positions of the implants must correspond to the given biological, mechanical and esthetic conditions. In situations where severe bone recession has occurred, the work of the dental team will involve not only the reconstruction of dental but also of gingival tissue. The dentogingival complex must primarily fulfill two aspects: function (chewing and speaking) and esthetics (alignment of the teeth and gums and lip support).

Clinical case presentation

When the 57-year-old female patient presented to our practice her teeth and the related bone structure were in very poor condition (Figs 1 and 2). Numerous teeth were missing in both the upper and lower jaw. Furthermore, the upper jaw showed considerable bone and gingival resorption. The patient wished to have fixed teeth again and regain an attractive appearance. Due to the extensive damage that had occurred, the complete restoration of both jaws with implants was indicated.

Surgical phase

As a result of sufficient bone structure in the lower jaw, this part of the mouth could be restored at once with four immediately loadable implants. During the reconstructive phase, the upper jaw had to be treated with a provisional removable denture due to the atrophied jaw ridge. The tooth extractions in the upper and lower jaw took place during one day. At the same time, the four lower jaw implants were inserted and loaded. An immediate denture was placed in the upper jaw.

During the osseointegration period of the mandibular implants, the bones in the upper jaw were reconstructed. The maxillary sinus and the jaw ridge were augmented in one appointment. At the next appointment, ten implants were placed according to the treatment plan. Six months after this intervention, the implants were exposed. As a result of a well-planned soft tissue management strategy, firm keratinized tissue had formed in adequate form. The permanent restorations for the upper and lower jaw were fabricated two months later (Figs. 3 and 4).

Prosthetic phase

The determination of the occlusal plane and the ideal incisal edge is an important step. When the upper and lower jaw have to be restored, it is important to start with the upper jaw. Alternatively, both jaws can be restored simultaneously.
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Articulation of the models The articulator allows the kinematics of the jaw to be correctly simulated. The aim of the treatment is not of a functional nature. It is intended to ensure the optimal occlusal integration of the restorations and the proper jaw movements during chewing, speaking and swallowing. In this particular case, the upper jaw model was positioned with the help of a facebow. Four impression posts were screwed on the implants in order to provide strong support and enhanced reliability. Alternatively, this step can take place directly on the immediately loaded provisional restorations. For this purpose, however, the model has to be mounted in the articulator of the dental practice. In the present case, the maxillary model was positioned in the correct relation to the hinge axis-orbital plane.

Subsequently, we adjusted the bite patterns in order to record the vertical dimension of occlusion. The centric relation is regarded as the reference position for adjusting the muscles to the centric and functional jaw relationship. The maxillary model was mounted in the articulator with the help of an antagonist jaw record. The centric and the vertical dimension of occlusion are correct, the immediately loaded provisional restorations can be used for this purpose.

The restorations have to be immobilized when they are mounted in the articulator. The Artex system allows the articulator of the dental practice to function as that of the laboratory to be synchronized.

Recording of the major facial criteria The Ditramax® system was used to transfer the clinical data related to the esthetic facial axes to the maxillary model (Figs. 5a and b). Two axes were marked on the plaster base of the model (vertical and horizontal). The vertical axis represents the sagittal/median plane. From the front, the horizontal axis is aligned parallel to the upper facial axis to the maxillary incisal axis and from the side to Camper’s plane. These markings, which should be very close to the working area, act as a guide for the dental technician in setting up the teeth. Therefore, the incisal line has a predictable parallel alignment to the bippilary line.

The incisal axis is aligned parallel to the sagittal/median plane. The Camper’s plane markings indicate the alignment of the occlusal plane. All these elements provide a sound rationale for the tooth set-up according to esthetic and functional principles.

Tooth selection and set-up We selected the tooth shade and the teeth on the basis of the SR Phonare® II tooth mould chart. Holding the teeth up against the lips of the patient quickly reveals whether or not they are in harmony with the facial features. The set-up of the teeth according to the Ditramax markings (Fig. 6) allows the situation to be clinically validated. In this case, particular attention was given to the esthetic integration of the dentogingival complex when the patient was smiling. The lip dynamics were shown with video clips. The functional criteria were also checked. The vertical dimension of occlusion had to be harmonious in order to achieve a balanced lower facial third and proper phonation.

Fabrication of the framework We felt that a CAD/CAM-fabricated titanium framework (e.g. Procer® from Nobel Biocare) would best fulfill this indication. The double scan technique allowed the implant model to be superimposed on the tooth set-up to construct the framework. In the next step, the framework was machined and then tried on the model and in the patient’s mouth (Fig. 7).

The cast impression and the high-performance processing system were used to ensure the optimal passive (tension-free) fit of the framework. This leads to an unattractive and difficult-to-polish result.

The surfaces of the teeth were characterized with a vertical and horizontal macrostructure. Particular attention was paid to mechanical polishing. Once the glycergene gel was removed, the restorations were finished with different polishing instruments (various grit sizes, pumice, leather buffing wheels and universal polishing pastes) (Fig. 11). In the present case, mechanical polishing was preferred to glazing with the cementation. The achieved esthetic results were considered to be the esthetic benchmark. With the introduction of state-of-the-art industrially fabricated acrylic teeth, which are especially designed for implant applications, the bar for esthetics has been raised in this category of materials. The teeth used in this case exhibit a true-to-nature morphology, which allows the restoration to be functionally integrated without any problems. Using the laboratory composite SR Nexco to recreate gingival tissue is a good restorative approach. In contrast to ceramic materials, the composite resin is easy to handle and delivers exceptionally esthetic results (Fig. 15). The light weight of the material is an added bonus. All ceramic restoration (zirconium oxide framework, layering ceramic, gingival composite) looks almost twice as much as a titanium-composite resin denture. An important advantage of the type of restoration described here is its long service life.

Conclusion The success of an implant-retained denture depends on the systematic coordination of all the surgical and prosthetic requirements.

A strict procedure needs to be followed from the treatment plan to the final outcome. Laying gingival portions with a laboratory composite represents a genuine improvement on previous materials and methods with regard to esthetics, handling and hygiene (Fig. 14).

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