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 are important principles of a good esthetic reconstruction. The provisional removable denture was then exchanged for the definitive removable denture. This was fitted with the appropriate orthodontic clasps and the occlusal plane was determined with a mounted model. The occlusal plane was then perfected with a trial wax-up by the dental technician. The denture was tried in on the patient and adjusted for comfort and esthetics. The wax-up was then returned to the technician. The upper and lower dentures were fabricated (Figs. 5 and 6). The teeth were arranged to optimize the esthetics and function (Figs. 7 and 8).

The denture was set up with pre-fabricated teeth (SR Phonares II). Fig. 3: After bone augmentation measures had taken place, ten implants were inserted. The picture shows the situation prior to the prosthetic phase.

The ground down composite resin areas were conditioned for receiving the light-curing laboratory composite SR Nexco. Fig. 8: The ground down composite resin areas were conditioned for receiving the light-curing laboratory composite SR Nexco.

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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sal line allows the tooth arches to be integrated more easily in terms of esthetics and function.

Impression taking
Open tray impressions were taken with a special plaster (Snow White) and unplugged impression posts. The considerable stiffness of the impression material completely immobilized the impression posts, which prevented any errors from occurring in the casting of the study models.

Articulation of the models
The articulator allows the kinematics of the jaw to be correctly simulated. The aim of the cast of the treatment is 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-ovalitan.

Subsequently, the adjusted bite patterns in order to record the vertical dimension of occlusion. The centric relationship 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 be synchronized without the need to re-adjust the upper jaw. It is called the Camper’s plane parallel to the sagittal/median plane. The incisal line is aligned parallel to the bipapillary line. The incisal axis is aligned parallel with 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 SB Phanores® II tooth mould chart. Holding the teeth upright 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 Ditraxam 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. Procera® from Nobel Bio-care) would best fulfil this indication.

The double scan technique allowed the implant model to be superimposed on the final set-up to construct the framework. In the next step, the framework was machined and tried on the model and in the patient’s mouth (Fig. 7).

The cast impression and the high-performance processing systems significantly contributed to ensuring the optimal passive (tension-free) fit of the framework, leading to an unattractive and difficult-to-polish result.

Prior to this step, a coating of glycerine gel (SR Gel) was applied to the surfaces to prevent oxygen inhibition, which could lead 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 glycerine gel was removed, the restorations were finished with different polishing instruments (various grit sizes, pumice, leather buffing wheels and universal polishing paste) (Fig. 11). In the present case, mechanical polishing was preferred to glazing with light-curing composite in order to preserve the definitive surface.

Attachment of the permanent dental restorations
The dentures were inserted manually with the help of muflint abutments from Nobel Biocare (Fig. 12). The screw channels were sealed with Teflon and light-curing composite resin.

The restoration described here is a genuine improvement on previous materials and methods with regard to esthetics, handling and hygiene (Fig. 12).