Enhanced gingival aesthetics

Optimising conventional dentures with an innovative veneering material

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Stability, function and aesthetics—in fabricating complete dentures, optimum results can only be achieved if the individual details are successfully combined. In addition to the rehabilitation of functional aspects, the aesthetic reconstruction of the teeth and soft oral tissue can considerably enhance a patient’s self-confidence.

Treating edentulous patients using conventional complete dentures continues to be a frequently applied therapy option. Yet, re-storing the edentulous jaw with denture teeth to achieve a functional and aesthetic rehabilitation poses a tough challenge to the treatment team. Biomechanical, physiological and geriatric concerns must be considered. True-to-nature replication of teeth and soft oral tissue is fundamental too. The objective is to restore patients’ appearance and confidence by providing them with natural-looking dentures.

Initial situation

A 58-year-old female patient presented with an edentulous upper jaw. She required a complete denture in the maxillary arch and defective metal-ceramic restorations in the mandibular arch. Her existing teeth were damaged and could not be used as abutments for new restorations. They had to be extracted. The patient was diagnosed with Angle Class III malocclusion. There was a severe anteroposterior discrepancy between the upper and lower arches. Seen in profile, the patient showed a prominently jutting chin and a protruding lower lip (Fig. 1). Her aesthetic appearance was impaired. In addition, the patient complained about the poor function and high mobility of the maxillary denture. A flabby ridge and severe bone resorption were present in the anterior part of the maxilla (Fig. 2). The alveolar ridge showed an asymmetrical progression in the mandibular arch (Fig. 3). After the initial assessment of the patient’s oral condition and consultation on the treatment options available to her, we decided to create new dentures for the maxilla and mandible. Conventional complete dentures were selected as the treatment option.

Model analysis

We began by taking a closed-mouth impression to create a primary record of the jaw relations. Accurate model analysis provided important information in preparation for the individual functional impression. These steps established the basis for a statically and functionally correct design of the dentures. The median palatine raphe, incisive papilla, first large palatine ruga, tuber maxillae, and crest of the alveolar ridge were marked on the maxillary model. On the mandibular model, the crest of the alveolar ridge, Pound’s line and the tuberosus alveolar mandible were marked as landmarks. The maxobuccal fold was determined on both models. The Angle Class III malocclusion can be clearly seen on the articulated models (Fig. 4).

High demands are placed on custom trays, because the functional impression is pivotal in achieving precisely fitting dentures. The objective is to maximise the supporting area of the denture base while taking into account the movements of the muscles. A suction effect must be established between the mucous membrane and denture base. For this purpose, the functional margins need to be fully contoured. The area of the flabby ridge was marked on the model and covered with a spacer to ease the pressure. Subsequently, customised trays were fabricated. In order to prevent the denture shifting upwards and forwards, a wide labial rim was created in the maxillary anterior vestibule. Dorsally, the tray ended at the vibrating line. The custom tray should also provide a suction effect in the mandible. Relatively voluminous margins were created to achieve this. Sufficient tongue space was provided and the anterior area was given a slightly concave contour. The retromolar pad was only thinly covered and a concave buccal shelf was created. A rim was placed on the crest of the alveolar ridge to provide a support surface for the bility and patient-specific characteristics were considered in the tooth set-up. The patient was in the habit of chewing food with her anterior teeth because of her Angle Class III malocclusion. This was to be avoided in the new dentures by providing enough freeway space between the anterior maxillary and mandibular teeth at the set-up. A great deal of attention was given to faithfully mimicking the natural oral soft tissue, as we wished to provide a maximum level of aesthetics already at the try-in stage. Five different shades of wax were used for characterisation. By creating vestibular gingival portions that have a delicate, yet effective, appearance, the customised look can be accentuated. Aesthetics, phonetics, occlusal vertical dimension and centric relation were assessed at the try-in of the wax-up and rated as good.

Completion

The wax-up was converted to resin using a proven method. We focused particularly on creating natural-looking soft tissue to enable the dentures to integrate unobtrusively into the oral surroundings. Accurately designed as they were, the dentures and porcelain gingiva were converted to a PMMA resin (IvoBase High Impact, Iovac Vivadent) using the Iovac system. As polymorisation shrinkage was fully compensated for, one-to-one repetitions of the wax-ups were attained.

The denture wax-ups were flanked and sputtered (Fig. 5). Once the moulds had been created and the wax boiled out, the flasks and teeth were prepared for the injection moulding process. The pre-dosed denture base material was mixed, and the capsules containing the mixed material and the flask were mounted on the injection device (Iovac Injecto). Once the appropriate programme had been selected, the injection process started. The result after divesting matched the requirements. Even fine details of the wax-up were exactly reproduced (Fig. 6). The dentures fitted the models accurately and required only minimal reworking.

Customised soft-tissue reconstruction using SR Nexco

The 3-D soft-tissue contours should be customised with shade characterisation. In the same way as different shades of wax are used for the try-in, different shades of resin should be used to reproduce the colour variations found in the natural gingiva. The light-curing laboratory composite SR Nexco could be ideally suited for this purpose. This material is available in a compre-
concave surfaces in the alveolar area, and subtle stipplings allowed us to achieve a 3-D depth effect quickly and easily (Fig. 10). The individual layers were light cured for 20 seconds each. Intermediate curing can, for instance, be performed with a Quick curing light (Ivoclar Vivadent). Prior to final polymerisation in a light furnace (Lumamat 100, Ivoclar Vivadent), a glycerine gel (SR Gel, Ivoclar Vivadent) was applied on to the denture base in a covering but not too thick a coating to minimise the formation of an inhibition layer. Only minor shape corrections were necessary before polishing the dentures. Tungsten carbide burs are best used for this step—the inhibition layer should be removed from the entire surface. Finishing was achieved by first smoothing the surfaces with rubber polishers, followed by mechanical high-gloss polishing at low rotational speed using a goat hair brush, leather buff and Universal Polishing Paste (Ivoclar Vivadent; Figs. 11 & 12).

Result

The patient attained a revived aesthetic appearance owing to the natural aesthetics of the maxillary and mandibular dentures. Her smile told us that she had her self-confidence back, which was the most satisfying reward for our work. The dentures were characterised by a dynamic interplay of shades and natural light reflections, nuanced gingival surfaces and strong, healthy-looking teeth (Fig. 13). They showed a stable fit and provided the desired suction effect. Assessment of the phonetic and functional criteria confirmed the success of the treatment. Compared with the preoperative situation, the new dentures imparted a clearly more youthful appearance to the face of the patient (Fig. 14).

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