Clinical Realities

Controlled Restorative Treatment of Compromised Anterior Dentition

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The aesthetic appearance of the maxillary anterior dentition is determined by the relationship between the shape, contour, color, position, and arrangement of the teeth to the healthy labial gingiva and the interdental papillae. When restoring the anterior dentition, the objective of a harmonious natural appearance of the teeth, surrounded by healthy soft tissue, should be achieved through a controlled predictable treatment protocol. In periodontally compromised teeth, the prognosis of each tooth should be assessed during the provisional phase of the treatment in environmental conditions simulating the expected definitive rehabilitation. In such complex cases, the provisional restoration serves not only as a diagnostic tool, but also as a complementary treatment modality in redesigning the appearance of the soft tissue. This article demonstrates the rehabilitation protocol and the various treatment stages of six anterior maxillary teeth, utilizing reproducible and controlled techniques for the achievement of predictable biocompatible, functional, and aesthetic results.

Preoperative Evaluation

A 33-year old female patient was referred to the restorative team by her dentist in the course of a full-mouth rehabilitation for completion of the treatment. The patient had previously suffered from generalized chronic periodontitis and had undergone various periodontal resective surgeries. Upon presentation, the patient's periodontal status was stable and exhibited no signs of inflammation due to meticulous hygiene maintenance. Recession of the gingiva was evident in the anterior region of both maxillae, which exposed narrow roots and black spaces between each root.

Although all the teeth were stable (mobility not exceeding grade I), a radiographic examination revealed severe horizontal bone resorption associated with the anterior dentition in the maxilla and the mandible. Several of the posterior maxillary teeth had been previously devitalized, as were the anterior teeth. In addition, the maxillary central incisors were also bonded with porcelain laminate veneers.

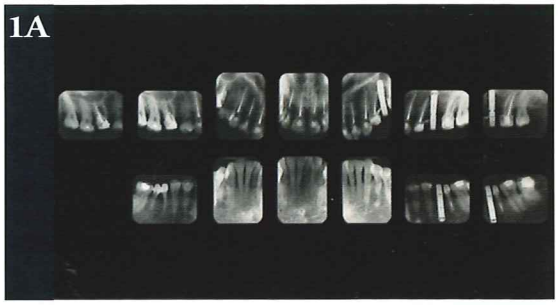

Figure 1A. Preoperative radiographs of the patient at presentation. The patient was referred to the restorative team for completion of prosthodontic treatment.

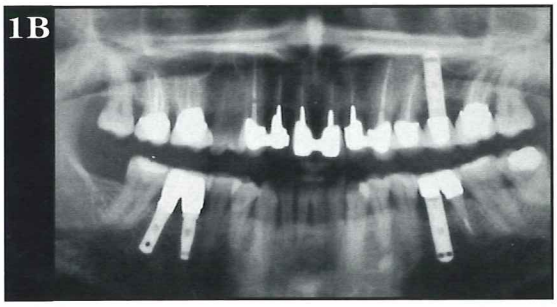

Figure 1B. Postoperative radiograph following prosthodontic therapy. The anterior dentition of the mandible would require periodical reevaluations and possible future treatment.

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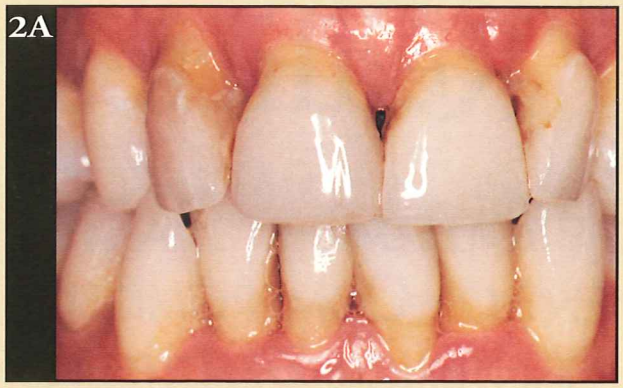
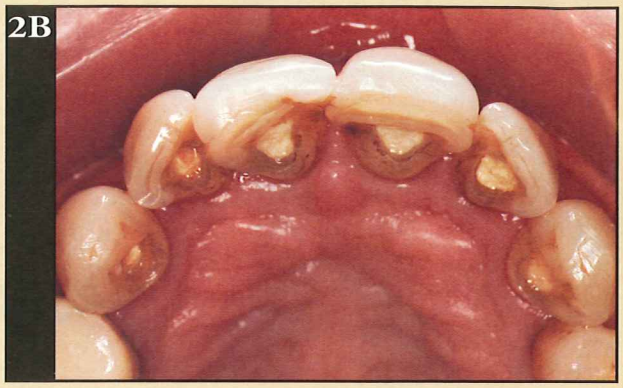

2A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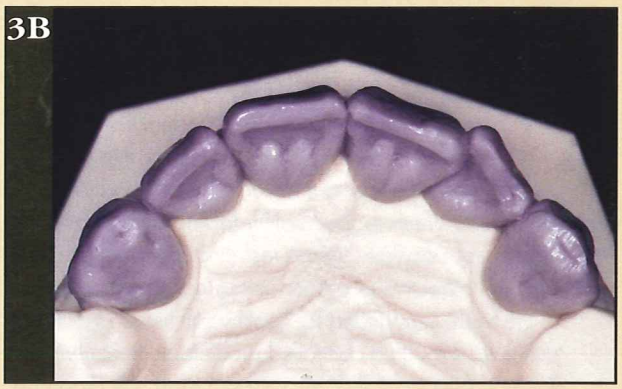
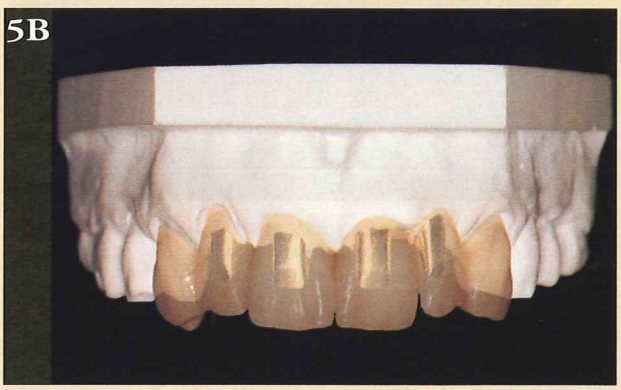
3A

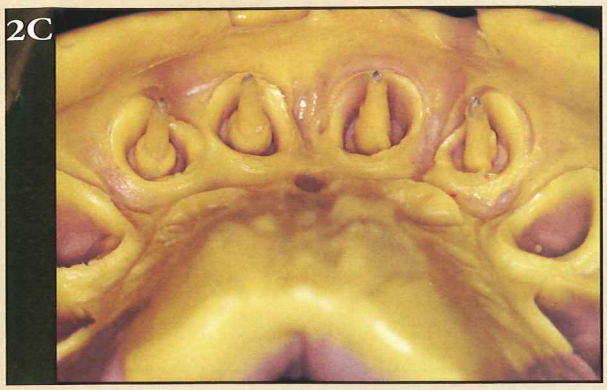

3B


4A


4B


5A


5B



Figures 2A,B,C. Preoperative facial and occlusal views of the maxillary anterior dentition. All six teeth had been previously devitalized. The central incisors had been restored with porcelain laminate veneers. Unaesthetic black spaces were evident between the exposed roots; a very steep curvature of the free gingiva was also present. The patient decided not to alter the crowded position of the mandibular anterior teeth, and desired to maintain their characteristic natural appearance.

The canine teeth were reinforced with direct bonded posts and the four incisors were prepared for cast inlay cores. A silicon impression of the prepared teeth was taken. The teeth were temporarily restored chairside with acrylic crowns in their original shape.

Figures 3A,B,C. A diagnostic waxup was created on the cast model from wax laminate veneers (Form Up Kit, Gema Diffusion, Horbourg, Switzerland). Since the patient requested aesthetic enhancement while retaining the existing teeth morphology, the shape of the crown restorations and their arrangement had to be adapted to those of the opposing mandibular dentition. Once the design of the teeth was confirmed by the patient and the restorative team, the treatment was continued. This model was negatively duplicated with a silicon material to serve as a template and guide the fabrication of the cast inlay cores and the provisional crown restorations.

Figures 4A,B,C. This specific design of the anterior inlay cores distributed the masticatory forces along the axis of the roots, and provided sufficient volume for the fabrication of natural-appearing crown restorations. The model was duplicated again in plaster.

Fabrication of the second set of provisional crowns in the "sandwich" technique was completed on the plaster model. Different shades of autopolymerized acrylic resin were poured into the silicon key, which was subsequently mounted on the model. Following polymerization, a buccal and incisal homogeneous mass was reduced to provide space for internal stratification and layering by photopolymerized resin colorants.

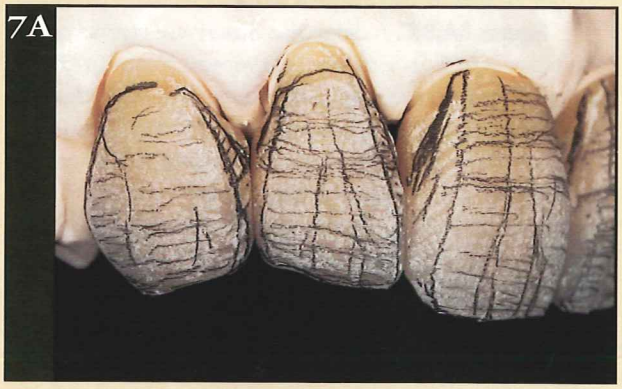
Figure 5A,B,C. The silicon key was used again for the layering of an external transparent self-cured acrylic layer, reproducing an optimal configuration and arrangement of the teeth.

Two models were delivered to the prosthodontist, consisting of four gold cast inlay cores and six provisional acrylic crown restorations.

Where the provisional resin crown restorations were cemented temporarily, the gold inlay cores were permanently cemented with zinc phosphate cement. The provisional restorations had been reevaluated for phonetics, dynamic occlusal patterns, aesthetics, and soft tissue adaptation for a period of 6 months, during which minor occlusal adjustments were executed intraorally.


6A


6B


7A


7B


8A


8B


9A


9B

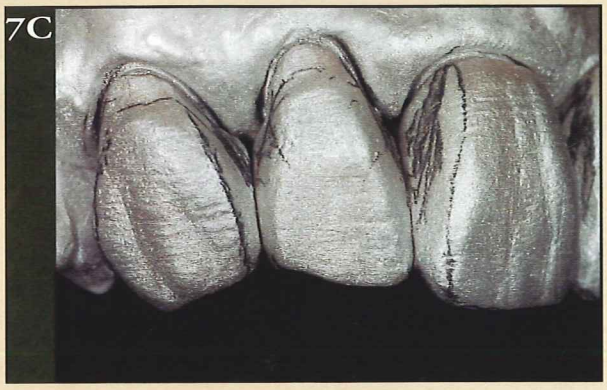


Figure 6A,B,C. Two impressions were taken and delivered to the laboratory: one of the abutment teeth and soft tissue and one of the intraorally modified provisional restorations. A new silicon template was developed accordingly to guide the fabrication of an exact replica of the provisional restorations to the definitive porcelain-fused-to-gold crowns.

Following the initial baking of porcelain, the internal color and visual effects of the definitive crown restorations were established. An initial texturization of the porcelain surface was performed following the final baking utilizing diamond burs.

Figure 7A,B,C. Once the initial texturization was completed, a pencil was used to mark the primary fissures and emphasize the lobes and transitional line angles.

After gentle texturization a primary finish was completed to provide the restorations with a matte surface appearance.

In order to prevent disturbances on the operator's eyes arising from the different colors of the porcelain and the white plaster, a metallic-silver dye was applied to all surfaces of the model and the restorations for a homogeneous appearance of the material. The minute details of the texture were highlighted; a pencil was utilized once again for fine tuning demarcation.

Figures 8A,B,C. Once a low glaze had been applied, the porcelain-fused-to-gold restorations were manually polished to a high, natural luster without damaging their microtexture and delivered for intraoral try-in to verify the fit of each individual crown. Due to biomechanical factors, it was previously decided to splint the crowns into three pairs (the two central incisors and each lateral incisor and canine) by postceramic soldering.

Figures 9A,B,C. Definitive bonding of the porcelain-fused-to-gold crown restorations was performed with an adhesive resin cement system (Panavia 21, J. Morita, Tustin, CA) due to the long porcelain neck at the margins of the crowns, which were created for cervical optical enhancement of the restorations. An optimal aesthetic result exhibits the harmonious integration of the crown restorations with the periodontally affected soft tissue and with the patient's lips.

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