Immediate Fixed Transitional Restoration in Implant Therapy

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The provisional restoration of the edentulous ridge in the absence of natural abutments has been a continuing challenge for clinicians in contemporary implant therapy. Although the immediate loading of implants has long been advocated by pioneers in this field, modern implant system protocols had previously avoided this concept and advocated the submerging of fixtures for an initial healing period in order to enable safe and predictable osseointegration.

In recent years, however, the discomfort to patients between stage I and stage II implant surgery has necessitated attempts to develop a solution that avoids the use of unstable removable dentures that might interfere with soft tissue healing. These investigations resulted in two concepts: 1) the immediate loading of the definitive implants in selected cases, and 2) the loading of additional modular implants to be removed in stage II. The modular transitional implants (MTI, Dentatus, New York, NY) can be inserted simultaneously with the definitive implants to support an immediate fixed interim restoration. In the past 3 years, this treatment modality has been selected and successfully utilized to provide function and comfort for patients.

Clinical Protocol

A 52-year-old female patient was referred to the authors for a full-mouth rehabilitation. Due to the hopeless prognosis of all the teeth (Figure 1A), an implant-supported restoration was the treatment alternative selected by the patient (Figure 1B). In the initial treatment plan, a staged extraction and implant placement protocols were to be utilized; the remaining mandibular teeth were to be extracted and immediately restored with a complete removable lower denture. This procedure would subsequently be replicated in the maxilla.

The third stage of the treatment plan required the placement of the implants in the maxilla and then in the mandible. Following extraction of the mandibular teeth, the patient complained of extreme discomfort during function with the removable denture and requested a more stable restoration. In order to accommodate the patient's request, the initial treatment plan was altered and the mandibular implant fixtures were inserted primarily, in conjunction with modular transitional implants, to support a fixed provisional restoration prior to the placement of maxillary implants.

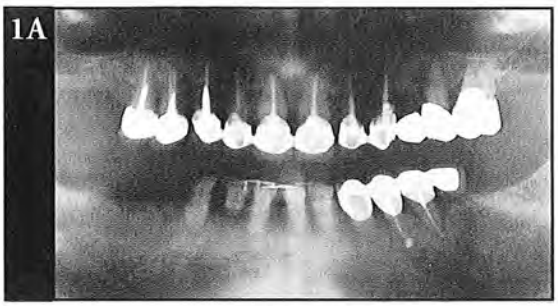

Figure 1A. A preoperative radiograph indicates that all teeth are severely periodontally involved with a hopeless prognosis.

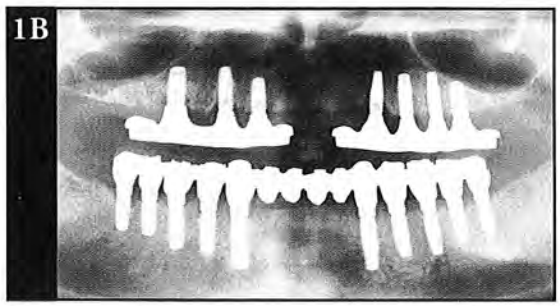

Figure 1B. A 3-year postoperative radiograph demonstrates the integration of implant-supported restorations in both jaws.

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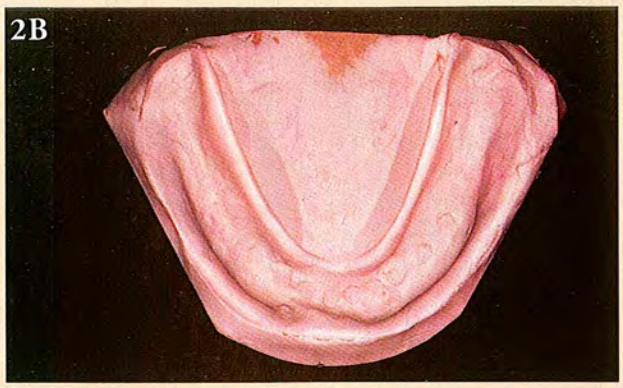
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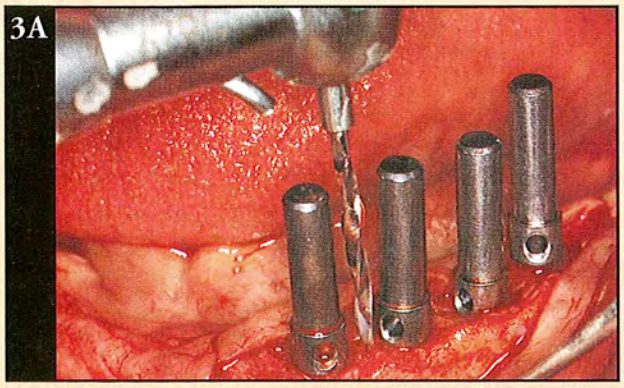
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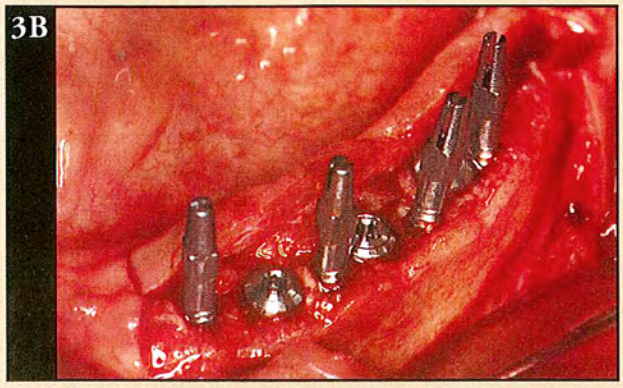
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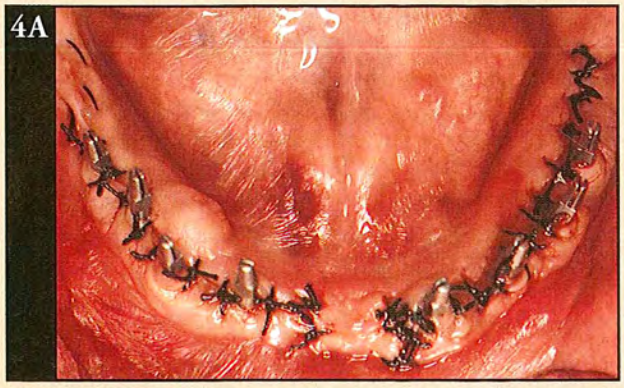
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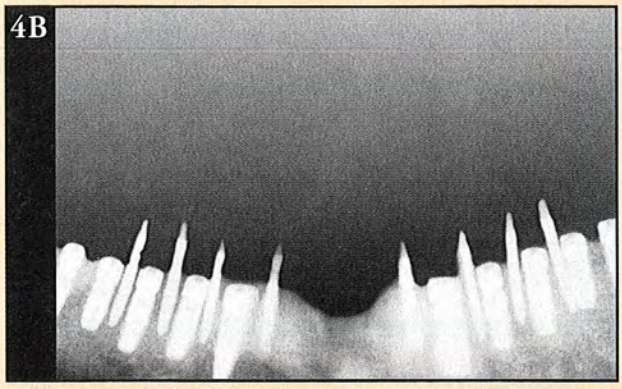
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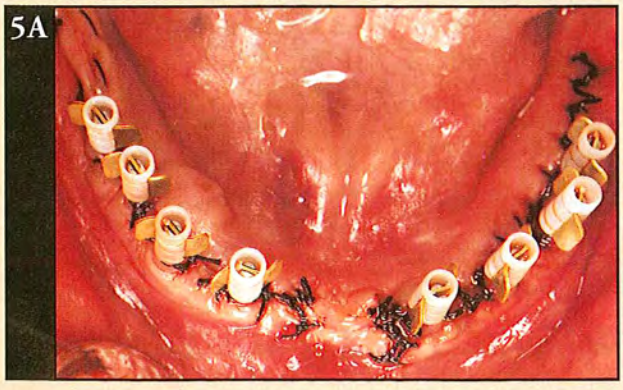
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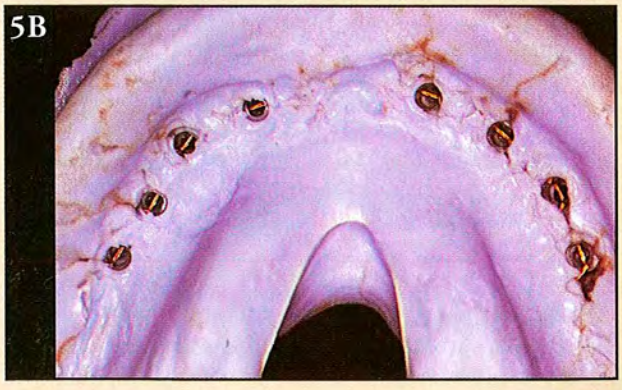
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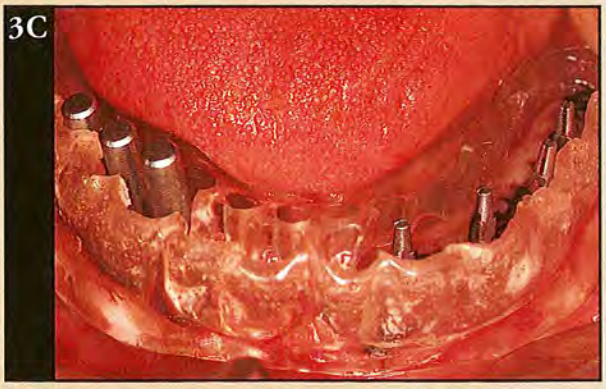
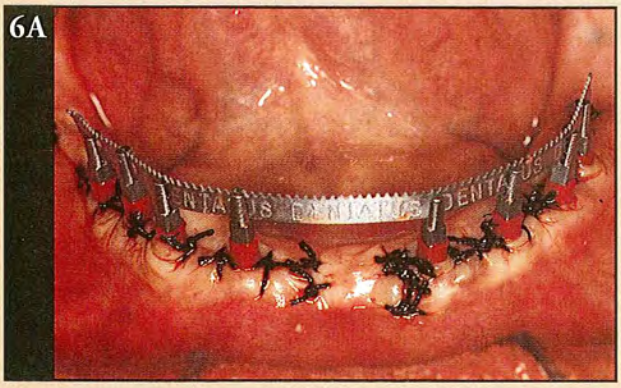


Figures 2A,B,C. Prior to extraction of the remaining mandibular teeth, the patient had been wearing a modified immediate removable partial denture. The maxillary teeth indicated for extraction were to be maintained in the interim with an improved oral hygiene regimen. Following extraction of the mandibular teeth and 4 subsequent months with an immediate removable complete denture, a surgical stent was fabricated. In order to facilitate precise placement of the definitive and the transitional implant fixtures, the stent was designed with removable acrylic teeth.

Figures 3A,B,C. The combination of midcrestal and vertical releasing incisions, followed by full-thickness mucoperiosteal flap elevation revealed a wide alveolar ridge on the left side. Five definitive implants were inserted (Steri-Oss, Yorba Linda, CA), and guiding pins were utilized with profile drills to create four osteotomies. Transitional implants (MTI, Dentatus, New York, NY) were placed in these osteotomies in between and buccally to the five definitive implants, and in approximation to the cortical plate. Following completion of implant placement on the left side, this procedure was accomplished on the right side. The surgical stent was utilized throughout the surgical procedures on both sides. Since the incisor teeth were located buccally to the residual crest, implant placement in this region was excluded.

Figures 4A,B,C. The buccal and lingual flaps were approximated and adapted using a combination of simple and mattress silk sutures. The definitive implants were submerged beneath the flaps, while the transitional implants were positioned in a manner that allowed them to protrude from the crest. They were aligned so that their slots established a continuous line mesiodistally. A panoramic radiograph was taken to record the position of all 18 implant fixtures in the mesiodistal direction; the occlusal radiograph demonstrated the buccal position of the transitional implants in relation to the definitive implants.

Figures 5A,B,C. An impression of the transitional implants was subsequently delivered to the laboratory. As this treatment was conducted more than 3 years ago, the initial version of the transitional implant system was utilized for the impression. Red gingival protective sleeves were placed over the neck of each transitional implant, and transfer plates were inserted into the slots of the implants and secured with circular plastic copings. The wings of each transfer plate were bent to increase their retention in the impression material. An irreversible hydrocolloid was utilized to retrieve the transfer copings, and the implant analogs were connected.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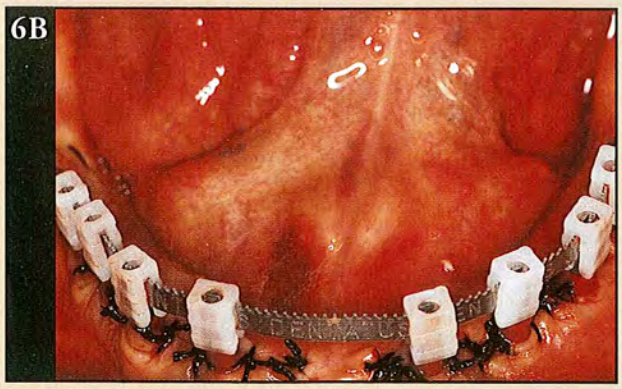
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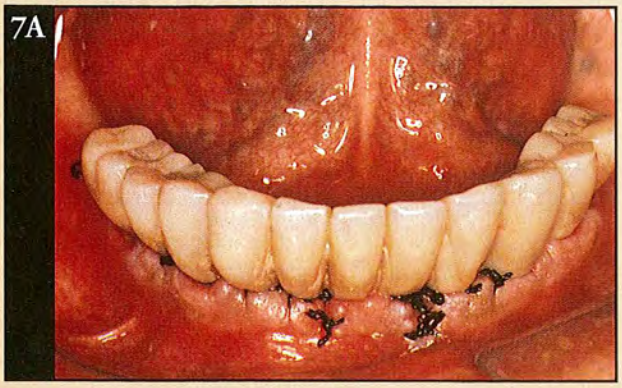
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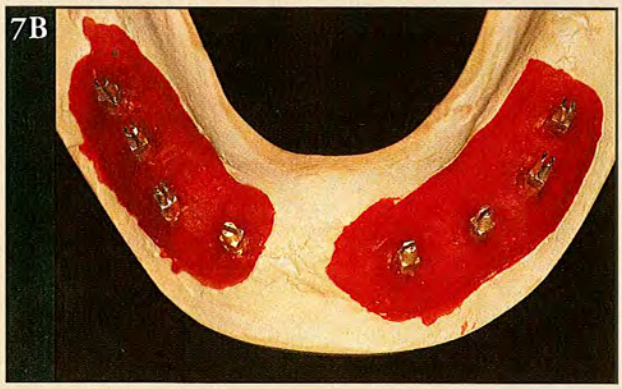
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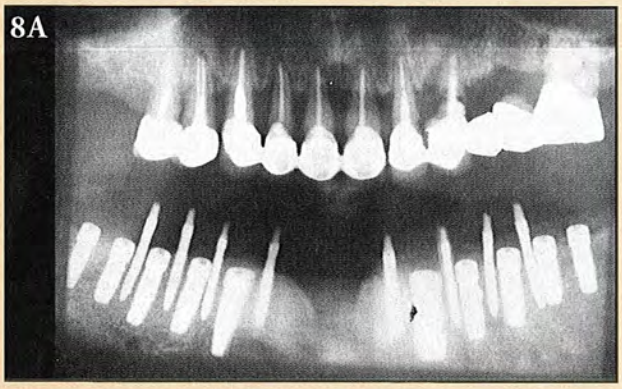
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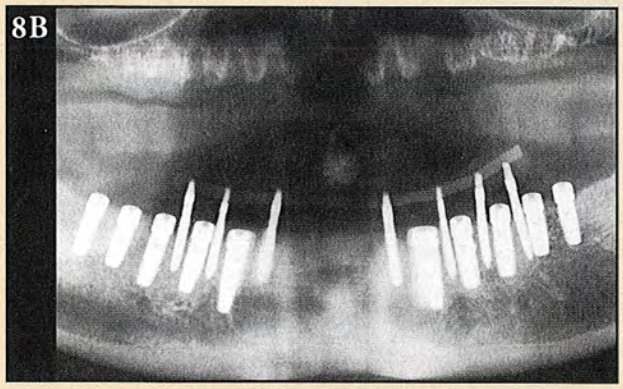
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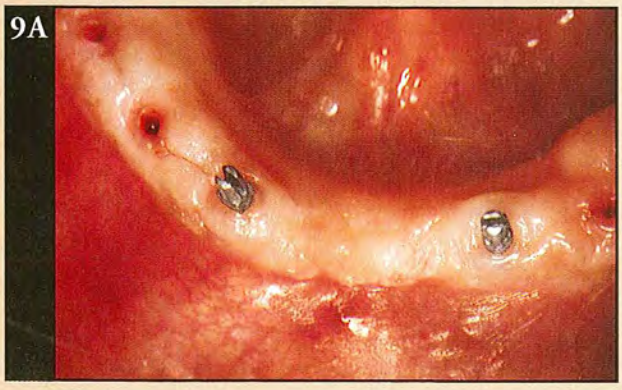
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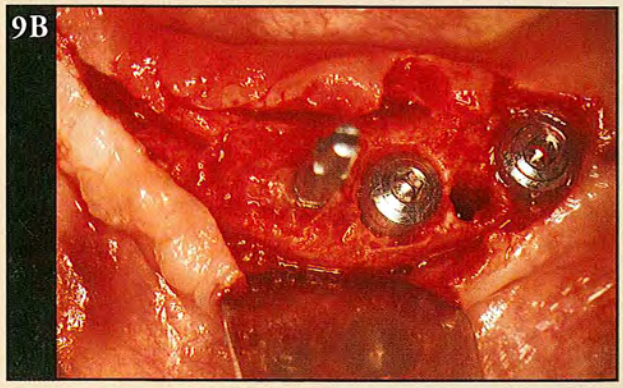
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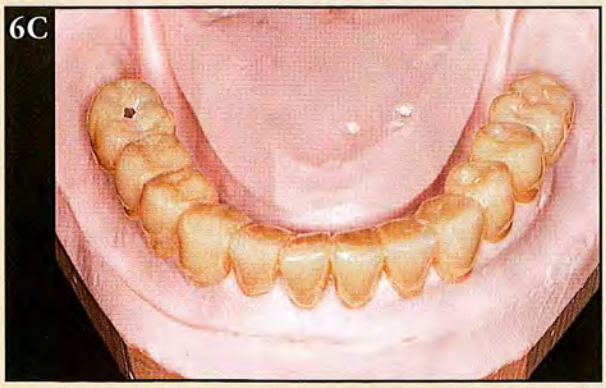
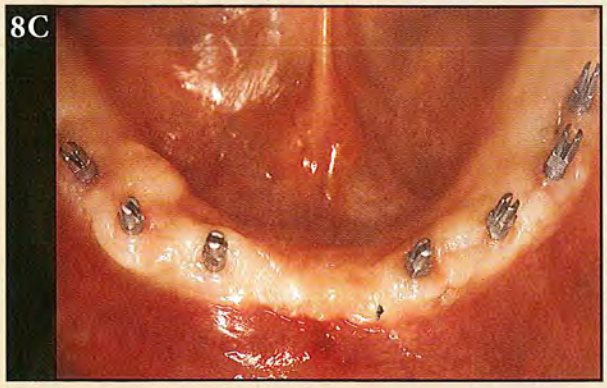
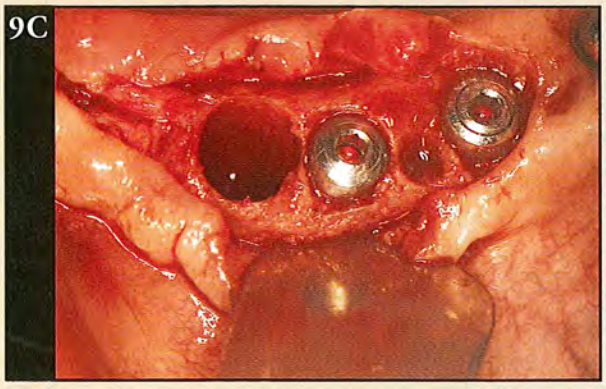






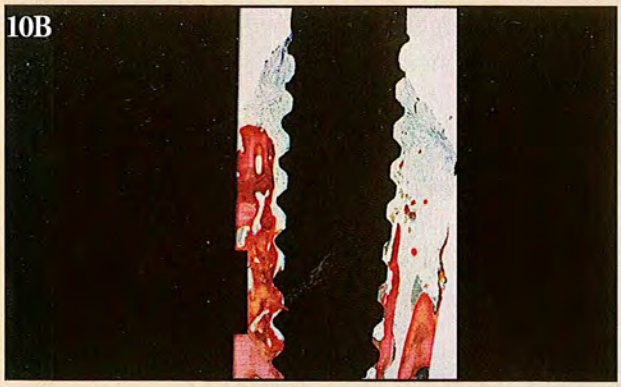
Figures 6A,B,C. Once the impressions had been recorded, an immediate provisional restoration was fabricated, followed by the positioning of a titanium connective bar in the slotted occlusal end of each transitional implant. Square plastic copings were subsequently placed over each implant to stabilize the bar, which was trimmed to the proper length. A prefabricated hollow fixed partial denture was then filled with acrylic resin and placed over the bar system and the plastic copings. During the setting of the acrylic resin, the prosthesis was gently removed and repositioned to prevent it from interlocking in unexpected undercuts.

Figures 7A,B,C. Following the trimming of the excess acrylic material, the provisional restoration margins were carefully contoured and polished chairside. The protecting gingival sleeves were removed from the transitional implants, the provisional fixed partial denture was carefully seated, and minor occlusal adjustments were performed. Utilizing the laboratory model as a guide, this prosthesis was carefully removed at the suture removal session 7 days postoperatively, at which time it was refined and glazed extraorally. The fixed partial denture was then reseated for a period of 3 months to allow the integration of the definitive implants.

Figures 8A,B,C. While the surgical procedure was being conducted on the mandible, the maxillary teeth were extracted, and an immediate complete denture was placed to the satisfaction of the patient. During a recall visit 2 months following implant placement, a mobile disintegrated transitional implant was detected and immediately extracted. The removal did not affect either the integrity or the function of the provisional prosthesis during its entire period of service. Three months following implant placement, a radiographic examination revealed a solid bone profile associated with the definitive and transitional implants, and significant radiographic translucency was not observed. Clinical examination revealed well-anchored transitional implants surrounded by a firm keratinized mucosa.

Figures 9A,B,C. Second-stage surgery was initiated by the removal of the transitional implants with a simple counterclockwise rotation. A palpable resistance was noted during removal, although it was relatively minor. A midcrestal incision, which was followed by full-thickness mucoperiosteal flap elevation, revealed stable and well-embedded definitive implants in a solid alveolar bone. The residual transitional implant sockets were observed to be intact, well isolated, and without communication to the definitive implants. After obtaining the patient's approval, a single transitional implant was removed with a trephine drill (0.5 mm) for histological examination.


10A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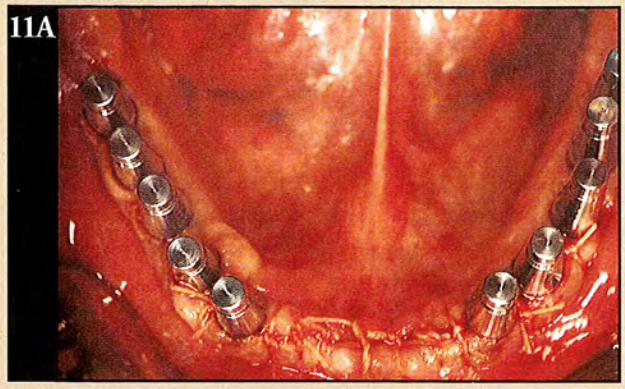
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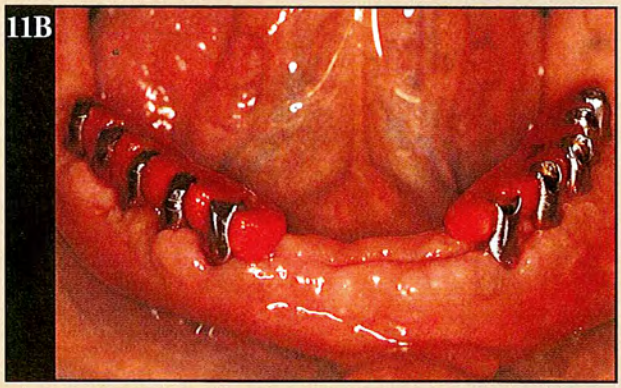
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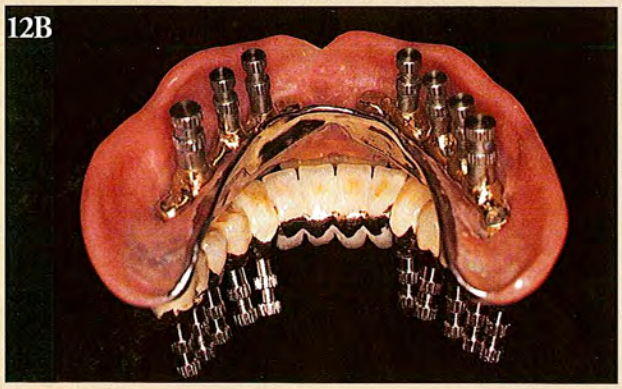
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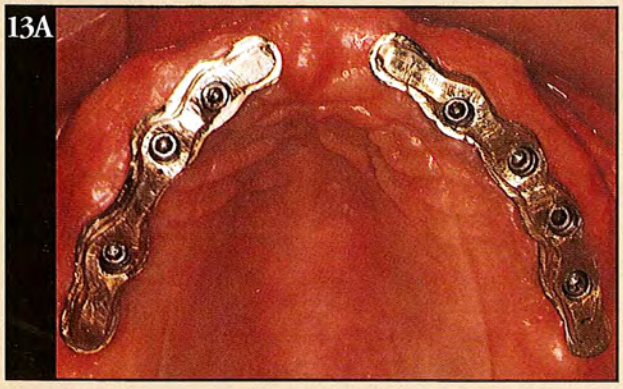
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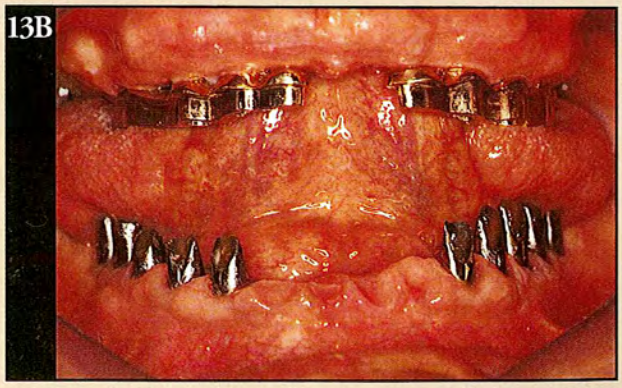
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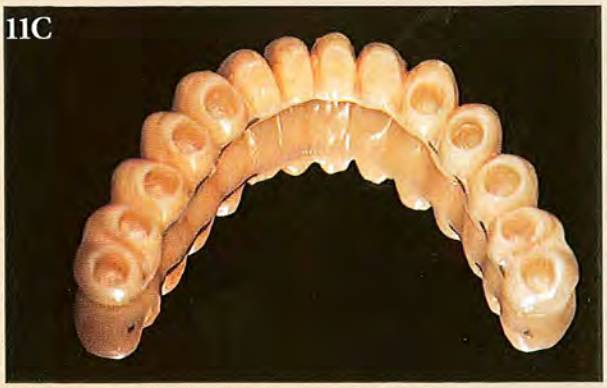

Figures 10A,B,C. Following the application of Stevenel's blue and van Gieson's picro fuchsin as histological stains, the coronal portion of the transitional implant demonstrated gingival connective tissue with no significant evidence of inflammation in approximation to its surface. New bone formation was observed near the midpoint, and the apical half of the implant fixture appeared well osseointegrated, with evidence of bone remodeling that indicated the presence of mature, healthy bone.

Figures 11A,B,C. At the time of second-stage surgery (ie, following removal of the transitional implants and exposure of the definitive implant heads), transfer copings were connected, recorded in a pickup impression, and utilized for the immediate fabrication of transmucosal abutments and a second provisional prosthesis. The implant heads were subsequently covered with healing abutments for a period of 24 hours. Following their fabrication in the laboratory the next day, prefabricated abutments were screwed to the implants in order to support a provisional acrylic bridge. The vicryl sutures were removed 7 days postoperatively, and modified abutments (DIA, Steri-Oss, Yorba Linda, CA) were connected to the implants with the aid of acrylic jigs. The provisional restoration was relined, finished and polished chairside, and temporarily cemented.

Figures 12A,B,C. In the following months, seven implants were placed in the maxilla. Following five months, the definitive restorations were fabricated and seated in the maxilla and mandible. A cemented fixed Artglass (Jelenko, Armonk, NY) fused-to-gold prosthesis was utilized on the mandibular implants, and an overlay removable denture was used on the maxillary implants; the attachment system consisted of two milled gold bars that were cantilevered mesially and distally. To increase the retention of the attachment system, the screw holes were used to accept the corresponding male studs that protruded from the superstructure of the overlay denture.

Figures 13A,B,C. Following careful examination by the treatment team, a removable denture was fabricated to support the upper lip by its flanges and to restore the maxillary implants. A resilient attachment system provided retention to the denture by the implants alone in repose and by the combination of soft tissue and implants for support, retention, and stability in function. This is evident by the demarcation of the palatal metal margins of the denture in the palatal mucosa. The anterior pontic sites of the lower restoration had matured, and papillae were adequately supported by each pontic. The patient has been periodically monitored for 3 years, at which time radiographic examination was performed to verify the clinical success of the comprehensive treatment (Figure 1B).

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