

# Transitioning a patient with failing anterior dentition and pre-existing posterior implant-supported fixed restorations using a staged approach

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## Key points

Suggests treating patients with failing anterior dentition and pre-existing posterior implant-supported fixed restorations using a staged approach.

Argues in favour of the fabrication of removable and fixed implant prostheses.

Suggests a method to deal with problems associated with the discontinuation of implant components.

## Abstract

This clinical report describes a staged approach using a removable partial denture (RPD) and a transitional implant-supported overdenture as interim prostheses in treating a failing anterior dentition with posterior implant-supported fixed dental prostheses (FPD), until the time a full-arch fixed implant-supported prosthesis may be inserted. The RPD replaced the anterior teeth following their extraction and during implant osseointegration. The implant-supported overdenture rehabilitated the arch during the fabrication phase of the definitive restoration.

## Introduction

The transition of a patient from a failing-tooth-supported occlusion to a full arch implant-supported occlusion is usually staged with transitional restorations to improve patient comfort and patient acceptance.<sup>1</sup> Most of the literature describing full-arch implant rehabilitation with different staged approach techniques involves a fixed interim prosthesis.<sup>1,2,3</sup> Fixed interim prostheses offer improved provisional aesthetics and soft-tissue management, however they involve longer, more complicated and expensive treatment protocols.<sup>4</sup> Cortes et al. have described a staged approach for full-arch implant rehabilitation utilising removable partial dentures (RPDs) as interim prostheses.<sup>4</sup> The advantages of a removable interim prosthesis include: simplicity of prosthesis fabrication

and adjustment, low cost, ease of insertion, improved patient acceptance, and the avoidance of undesired pressure on the healing abutments during the osseointegration phase.<sup>4</sup>

Implants have become an integral part of restorative dentistry.<sup>5,6,7</sup> Implants have been utilised for simple single tooth replacement as well as for more complex restorations, such as full mouth rehabilitations.<sup>8,9,10,11</sup> Hence, it is common to see patients with a few hopeless teeth and existing implant-supported fixed dental prostheses (FDP). The treatment plan for these patients should be carefully formulated by evaluating the number, angulation, antero-posterior spread, and the location and placement of the existing implants; examining the condition of the existing implant-supported restorations; assessing the type of definitive restoration (fixed/removable) desired, and also the amount and quality of bone available post-extraction of the hopeless teeth.

In many cases treatment planned for implant-supported restorations, the hopeless teeth requiring removal are periodontally compromised leading to the question of whether dental implants may provide a predictable outcome. Studies have shown that implant therapy is not a contraindication in

individuals with a history of periodontitis.<sup>12</sup> Patients' need to be informed of potential problems that could occur due to the prior disease process, especially those patients who are partially edentulous. Periodontal treatment pre- and post-implant placement is highly recommended to limit the potential problems.<sup>13</sup>

In addition, a common and critical problem experienced in patients with existing implant-supported restorations is the difficulty in obtaining implant prosthetic components.<sup>14</sup> This problem is attributed to an increase in the number of implant manufacturers during the last two decades.<sup>14</sup> Some of these manufacturers have discontinued production, making it even more challenging to procure implant components.<sup>14</sup> Also, it is complicated, cumbersome and expensive to restore the different implant type in each dental arch; as opposed to restoring a single implant type.<sup>14</sup>

This clinical report describes the steps involved in transitioning and rehabilitating a patient with anterior hopeless teeth and existing implant-supported FDPs with a full arch implant-supported fixed prostheses using a staged approach with two types of interim restorations.

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**Clinical report**

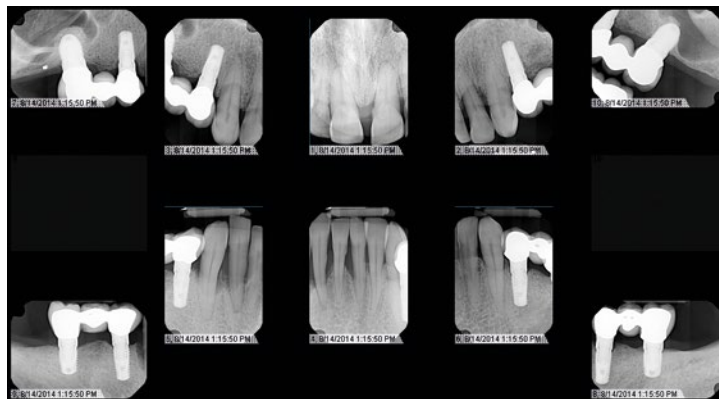
A 54-year-old male in good health presented to the faculty practice at the University of Tennessee Health Science Centre, College of Dentistry. He had lost all posterior teeth due to periodontal disease six years ago. Eight implants (Camlog Biotechnologies AG) were placed, five years ago, in tooth locations 3, 5, 12, 15, 18, 20, 29 and 31, to replace the missing teeth with implant-supported FDPs (Fig. 1). The patient was referred to a periodontist by his general dentist four months ago to evaluate what the patient described as anterior mobile teeth. The periodontist suggested surgical intervention to prolong the life of the remaining teeth but with a guarded prognosis for the overall treatment. The periodontist also noted that there were no signs of peri-mucositis or peri-implantitis associated with the existing implants. The patient explained he had endured the same surgical treatment with his posterior teeth in the past without a positive result. The patient was successfully treated with posterior implants in the maxilla and mandible and chose to investigate the same for the anterior mandible and maxilla. Hence, he was referred to our clinic by his general dentist due to complexity of his case.

Radiographs were made and a comprehensive examination was accomplished to develop a treatment plan for the patient. Both the maxillary and the mandibular anterior teeth had severe bone loss and grade II mobility. Diagnostic impressions were made with irreversible hydrocolloid (Jeltrate Alginate, Dentsply International Inc), diagnostic casts were made with type III dental stone (Microstone, WhipMix Corporation), and interocclusal records (face bow and centric relation) were registered. The diagnostic casts were mounted in a class III semi-adjustable (Whipmix 2240, Whipmix Corporation) articulator. Mounted casts with clinically-adjusted wax rims were used to measure available vertical restorative space for both the arches, which was determined to be 10–12 mm for each of the arches.<sup>15</sup> The patient desired fixed and cost-effective restorations. However, he was concerned of being without anterior teeth following their extraction and until treatment completion.

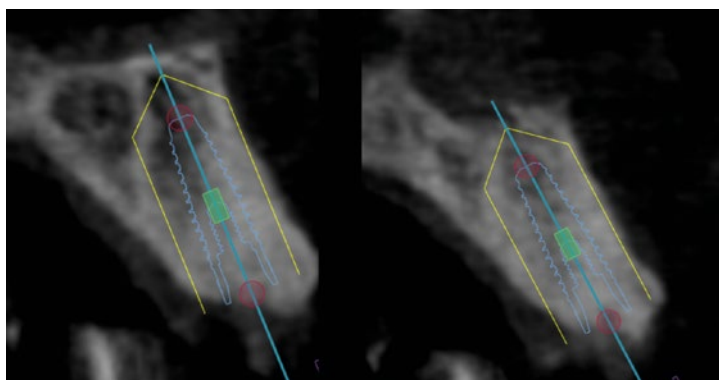
A cone beam computed tomography (CBCT) scan (Kodak 9000, Carestream Health Inc) was obtained to determine the amount and quality of bone in the anterior regions of both the jaws. The CBCT scan revealed that there was sufficient bone for implant placement. The patient was presented with an option of four additional implants in the pre-maxilla and mandibular symphysis

supporting screw-retained FDPs (posterior FDPs would also need replacement due to fractured porcelain and wear) or two implants in the pre-maxilla and mandibular symphysis supporting fixed dentures that would include support from

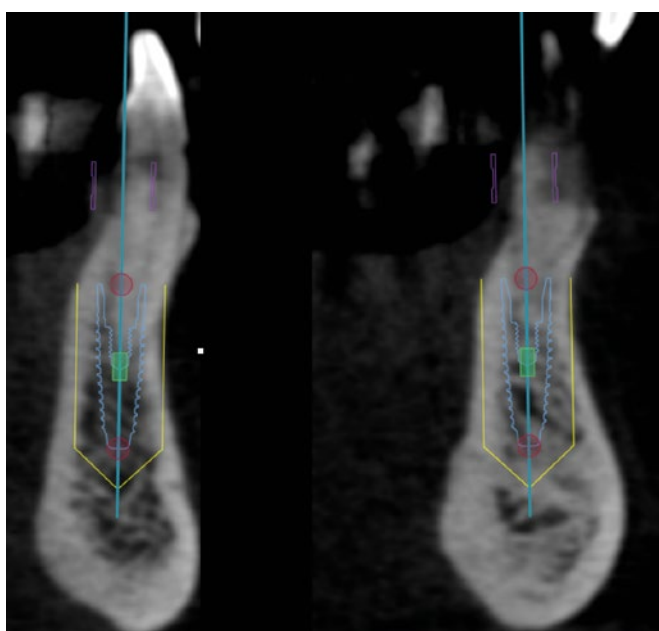
the posterior implants. After deliberation, the patient chose the plan for fixed dentures. Two implants were planned in the pre-maxilla and mandibular symphysis based on the trajectory of the existing dentition (Fig 2 and Fig 3). The



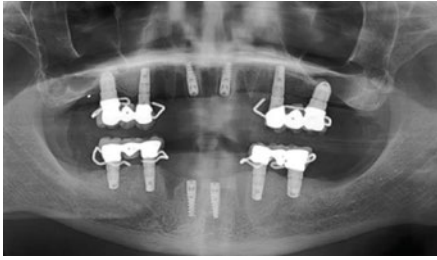
**Fig. 1 Full mouth series of intraoral radiographs**



**Fig. 2 Maxillary planned implants**



**Fig. 3 Mandibular planned implants**



**Fig. 4** Panoramic radiograph depicting placement of anterior implants and acrylic resin removable partial dentures



**Fig. 5** Impression copings attached to maxillary anterior implants



**Fig. 6** Impression copings attached to mandibular anterior implants



**Fig. 7** Casts mounted in a semi-adjustable articulator using the interocclusal records



**Fig. 8** Multiunit abutments attached to all maxillary implants following sectioning and removal of existing posterior FDPs



**Fig. 9** Multiunit abutments attached to all mandibular implants following sectioning and removal of existing posterior FDPs

additional two implants in the anterior maxilla and mandibular symphysis would provide a good anterior posterior spread for biomechanical support of the definitive prostheses.

Treatment steps for both jaws were the same and included: scaling and root planing of anterior teeth; chlorhexidine (0.12%) daily rinse for two weeks to promote healing and remove inflammation associated with the anterior teeth; extraction of the anterior teeth; immediate implant placement; placement of immediate acrylic RPD at the time of extraction and implant placement; placement of a transitional locator-supported overdenture following the healing of the implants; and, finally, placement of the definitive prostheses.

### Extraction and implant placement

Following scaling and root planing, along with a chlorhexidine (0.12%) regimen for the anterior teeth, the shade and mould were selected for the patient and the mounted diagnostic casts were sent to the laboratory for fabrication of immediate interim RPDs. The surgical procedure was performed under local anaesthesia with 4% articaine (1:100,000 epi). The anterior maxillary and mandibular teeth were removed atraumatically. Muco-periosteal flaps were reflected and the implants were placed (in tooth locations 8, 9, 24, 25) (Nobel Active 3.5 mm diameter, 11.5 mm length) with an insertion torque >35 Ncm following the manufacturers

recommendations (Fig. 4). Cover screws were placed, and the flaps were sutured with 4-0 silk. The immediate acrylic RPDs were adjusted, relined and placed in the patient's mouth.

### Fabrication and placement of transitional overdentures

Following four months of healing, the implants were uncovered and the cover screws were replaced with healing abutments. Closed tray impression copings were attached to maxillary and mandibular anterior implants (Fig 5 and Fig 6) and maxillary and mandibular impressions were made and poured with type III dental stone. The patient's vertical dimension of rest (VDR) was determined using pleasure points along with the patient swallowing and relaxing. Based on the established VDR, the patient's existing vertical dimension of occlusion (VDO) was increased by 2 mm. Interocclusal records were made at the new VDO using trial record bases and clinically-adjusted wax occlusal rims. Casts were mounted in a semi-adjustable articulator (WhipMix 2240, WhipMix Corporation) (Fig. 7), the anterior prosthetic teeth were set, and a wax try-in procedure was accomplished for the anterior teeth. The mounted casts, records and detailed instructions were sent to the laboratory for fabrication of the transitional

overdentures. The laboratory was instructed to eliminate the stone posterior teeth from the cast, replace them with prosthetic teeth, develop appropriate occlusion and process the prostheses.

On the day of prostheses placement, the existing implant-supported FDPs were sectioned and removed. Low-profile healing abutments were placed and the dentures relined with a chairside hard reline material (KOOLINER, GC America). Due to the limited availability of the implant prosthetic components for the previously placed implants (Camlog), and also to provide abutment platform continuity for implant components, multi-unit abutments (Nobel Biocare USA) were attached to the implants and torqued to 35 Ncm (Fig 8 and Fig 9). The prostheses were disclosed and relieved appropriately in the locations of the locator abutments. Locator attachments (Zest Dental Solutions) were attached to the multi-unit abutments. Remount casts were fabricated and a clinical remount procedure was completed to refine the occlusion. The locator attachments were picked up directly, chairside using Quick Up (VOCO GmbH) per the manufacturer's recommendations. The maxillary and mandibular implant-supported overdentures were then polished and delivered to the patient.

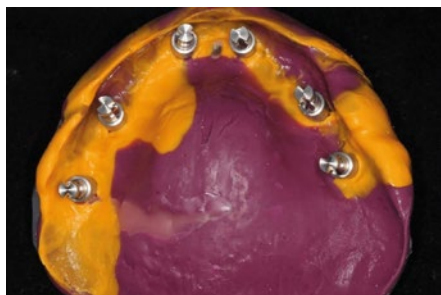


Fig. 10 Maxillary master impression



Fig. 11 Mandibular master impression



Fig. 12 Panoramic radiograph depicting attachment of verification indices to implants



Fig. 13 Maxillary titanium framework



Fig. 14 Mandibular titanium framework



Fig. 15 Placement of maxillary definitive prosthesis

**Fabrication and placement of definitive prostheses**

The locator attachments were removed before each step of the definitive prostheses fabrication and reattached to the multi-unit abutments following the completion of the procedure. Primary closed tray impressions were made with vinyl polysiloxane (VPS) impression material (Aquasil monohase, Dentsply Sirona Inc) by attaching the closed tray multi-unit impressions copings to the multi-unit abutments and cast in type III stone (Microstone, Whipmix Corporation). The open tray master impressions were also made with VPS impression material (Aquasil monohase, Dentsply Sirona Inc) by attaching the open tray impression copings along with the resin impression indices to the multi-unit abutments (Fig 10 and Fig 11).

Verification indices were fabricated to verify the accuracy of the definitive casts using the one screw test (Fig.12). Radiographs were made at every step to ensure and verify complete seating of the prosthetic components. Trial record bases and wax occlusal rims were fabricated and clinically-adjusted according to the patient aesthetics, phonetics and occlusal vertical dimension. Face bow and interocclusal records were registered, and the casts mounted in a semi-adjustable articulator (Whipmix 2240, WhipMix Corporation). Prosthetic teeth (SR

Vivodent DCL, Ortholingual DCL, Ivoclar Vivadent Inc) were set and a wax try-in procedure was accomplished. The definitive cast bases were indexed and putty matrices were fabricated to register the prosthetic teeth positions. A resin pattern (for the fixed denture framework) was fabricated using the putty matrix as a guide. The pattern was scanned and a titanium framework copy milled (Nobel Procera, Nobel Biocare Services Inc) (Fig 13 and Fig 14).

The putty matrix was used to transfer the prosthetic teeth to the titanium framework followed by a try-in to verify aesthetics, phonetics and occlusion (mutually protective occlusion). Implant-supported fixed complete dentures were processed by means of injection moulding (SR Ivocap, Ivoclar Vivadent Inc). The prostheses were

tried in the patient's mouth to verify the fit and occlusion, and adjusted as necessary. A radiograph was taken to confirm the complete seating of the prostheses. The attachment screws were torqued to 20 Ncm and the screw access holes were packed with cotton and composite resin (Tetric N-Ceram, Ivoclar Vivadent Inc) (Fig 15 and Fig 16). The patient was pleased with his prostheses (Fig. 17). The patient was advised to use an electric toothbrush and a variety of brush heads to clean the soft tissues and all the surfaces of the prostheses, including its undersurface, and placed on a biannual recall schedule. The patient was informed that the acrylic prosthetic teeth would wear and need to be replaced every five to seven years.



Fig. 16 Placement of mandibular definitive prosthesis



Fig. 17 Patient's smile

## Summary

The use of a staged approach with two transitional restorations can be recommended for patients with failing natural dentition and previously placed implants. Both the transitional restorations were simple to fabricate, cost-effective, and easy to insert.

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