

# Workflow for the full-mouth rehabilitation of a patient with different prosthetic materials in opposing arches: A bold move in desperate scenario

Vaishnavi Rajaraman,  
Thiyaneswaran Nesappan,  
Subhabrata Maiti,  
Subhashree Rohinikumar

Department of Prosthodontics and  
Implantology, Saveetha Dental College  
and Hospitals, Saveetha Institute  
of Medical and Technical Sciences,  
Saveetha University, Chennai,  
Tamil Nadu, India

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## ABSTRACT

Fixed rehabilitation is an exhaustive approach for most dental practitioners to treat partial or complete edentulism. In recent years, we are witnessing a digital transformation in prosthodontics and smile makeovers. This requires an in-depth understanding of concepts and the skills to achieve desired clinical results. Many situations of the oral cavity often need fixed rehabilitation treatment. This extensive treatment primarily solves two goals: maintains crown integrity and also achieves optimal esthetics. To restore lost parts of the stomatognathic system, a multidisciplinary approach is of utmost importance. The treatment options may range from removable implant-supported dentures to fixed implant-supported prostheses. The choice of treatment relies on the limitations of anatomic structures and existing. Partial or complete edentulousness can inadvertently reduce the quality of life of the patient and may hinder physiology. This report narrates a combination of two types of dental prosthetic material to obtain a desirable outcome in fixed rehabilitation of a patient. Furthermore, it highlights the management of complete treatment in a limited period and patient appointments.

**Key words:** Edentulous, full-mouth rehabilitation, hybrid, implant

## INTRODUCTION

Soft tissues of the oral cavity can be replaced by overdentures or hybrid prostheses which furnish support when compared to the traditional fixed prosthesis (FP). With the advent of computer-aided technology and the advancement in dental materials, loss of soft tissue can

be efficiently replaced and interdental papilla can be artificially recreated.<sup>[1]</sup>

Full-mouth rehabilitation concepts have been ever-changing and evolving. To formulate a customized set of rules for a patient is very difficult. It is indeed the skill and knowledge of the specialist in diagnosing the case and developing a template for the individual. Edentulism can be a double-edged sword here, wherein there is the freedom to decide multiple options yet the alveolar bone and soft-tissue support is of utmost importance.<sup>[2]</sup>

Achieving esthetics and function in implantology is possible only by the careful execution of multiple rehabilitation

### Address for correspondence:

Dr. Vaishnavi Rajaraman,  
Department of Prosthodontics and Implantology, Saveetha  
Dental College and Hospitals, Saveetha Institute of Medical and  
Technical Sciences, Saveetha University, Chennai - 600 077,  
Tamil Nadu, India.  
E-mail: vaishnavir.sdc@saveetha.com

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phases such as presurgical planning, surgical phase, and prosthetic stage. This case report addresses the design of a metal–ceramic prosthesis in the maxillary arch and a hybrid prosthesis in the mandible that incorporates a metal frame over implants on which the denture rests.

## CASE REPORT

A female patient aged 53 years reported to the Department of Prosthodontics, Saveetha Dental College and Hospital, with a chief complaint of sensitivity, maxillary anterior proclination, and completely missing teeth in the mandible for 4 years. No medical history or family history was reported, relevant to the same. On clinical examination, intraorally, the patient had a complete set of permanent dentition in the maxillary arch and a completely edentulous mandibular arch. Maxillary teeth showed normal morphology of crown structure and mild attrition of teeth. The extraoral frontal smile showed maxillary anterior proclination [Figure 1]. The soft tissue of the patient was firm in consistency and firmly attached to the underlying alveolar bone with adequate keratinization. The smile line of the patient was medium, with a papillary smile. On clinical examination of the patient, a diagnosis of completely edentulous maxillary and edentulous mandible was concluded.

## DISCUSSION

To correct the proclination and attrition of the crown structure with structural support as well as provide enhanced esthetics, a treatment plan was devised which involved full-veneer restorations of the maxillary dentition from the right second premolar to the left second premolar with a small cantilever first molar on each side as the patient had a wide smile. An FP-3 type of hybrid prosthesis with four implants in the mandibular arch was planned (Straumann bone level implants SLActive®).

The choice of material used for this was a metal coping structure layered with ceramic for the maxillary arch and a

hybrid prosthesis in the mandible that incorporates a metal frame over implants on which the denture rests. In the mandibular arch, an implant-supported hybrid prosthesis, considering the inadequate bone height and width in mandibular posteriors.

After obtaining informed consent from the patient, for the treatment, a detailed clinical appointment schedule was planned. In the first appointment, photographs (with the patient's consent), diagnostic impressions with irreversible hydrocolloid (Zhermack, Tropicalgin), face-bow transfer, and jaw relation for diagnostic mounting were done [Figure 1]. The second appointment included gross tooth preparations of the maxillary arch followed by temporization and mandibular implant placement (Straumann bone level implants SLActive®). Stage 2 recovery of the mandibular implants was planned after 3 months [Figure 2]. In the third appointment, master impressions of maxillary and open-tray impressions of mandibular arches [Figure 3] with vinyl polysiloxane material (Zhermack Elite HD+) and monophasic material were taken. Face-bow record and jaw relation were taken after the master impressions. The fourth appointment consisted of a metal coping trial in the maxillary arch and a framework trial in mandibular arch [Figure 4]. Ceramic bisque trial in maxillary arch and teeth setting trial in mandibular arch with corrections was done in the fifth appointment [Figure 5]. This was followed by final cementation after glazing of maxillary prosthesis and insertion of hybrid prosthesis in mandibular arch [Figure 6].

The existing centric relation was confirmed with a bilateral manipulative technique (Dawson technique). The vertical dimension (VD) at rest and at occlusion was determined using wax occlusal rims. It was deciphered to restore the existing VD. Intraoral diagnostic impression (Tropicalgin, Zhermack®) was taken and transferred to the semiadjustable articulator (STRATOS 300, Ivoclar®) with the help of the jaw



**Figure 1:** Extraoral frontal view of the patient showing maxillary anterior proclination



**Figure 2:** Stage 2 recovery of the mandibular implants (Straumann bone level implants SLActive®)

relation records. The diagnostic models were scanned in a lab scanner (Medit T500<sup>®</sup>) and a workflow was planned for the patient. Temporization was performed with polymethyl methacrylate material in the maxillary arch to correct the occlusal plane at an existing vertical dimension. The patient was observed for any changes related to the stomatognathic system.

### Stage I – surgical phase

Local anesthesia was administered with 1:100,000 lignocaine with epinephrine in the form of an inferior alveolar nerve block in the mandible. A mid-crestal incision followed by a full-thickness mucoperiosteal flap extending from molar to molar in mandibular arches full thickness was elevated.<sup>[3]</sup> Releasing incisions were given bilaterally to ease the vision of the operating field. A pilot drill was used and paralleling pins were used to check the position of implants in each arch.<sup>[4]</sup> Sequential drilling was then continued to finally place the following implants: 31, 41, 33, and 43 (4.1 mm × 10 mm). After successful implant placement, the corresponding cover screws were placed over the implants and the flap was closed with simple interrupted sutures (ETHICON<sup>®</sup>).<sup>[5]</sup>

### Postoperative instructions and recall

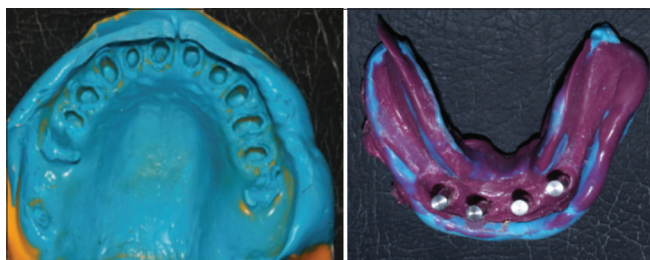
The patient was advised to apply oxygen-enriched gel consisting of sodium saccharin, sodium perborate, sodium

gluconate, lactoferrin gluconate (highly concentrated active oxygen), aqua, alcohol, cellulose gum, citric acid, glycerin, xanthan gum, silica, and polyethylene glycol-32 (Blue M<sup>®</sup> Oral gel). Over the implant site, two times a day to enhance the healing process and effectiveness of oxygen increases angiogenesis and promotes revascularization, re-epithelization, and cell proliferation. The patient was recalled for suture removal 1 week after and evaluated for healing. Temporary mandibular complete denture was relined and inserted in the patient's mouth.<sup>[6]</sup>

### Stage II – prosthetic phase

Stage II recovery of the mandible was done by making punch cuts near implant sites and replacing the cover screws with healing caps to develop a soft-tissue emergence profile [Figure 2].<sup>[7]</sup> After a waiting period of 1 week, the patient was recalled for an impression-making procedure.

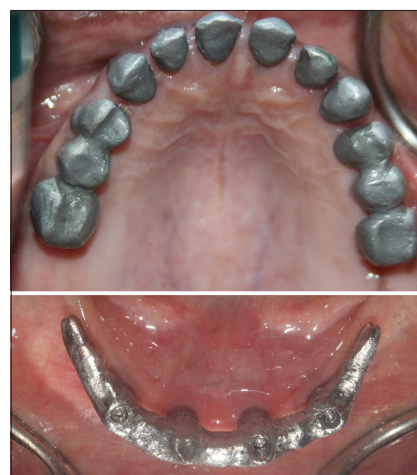
In the maxillary arch to expose all equigingival margins of the tooth preparation, gingival retraction was performed before impression making.<sup>[8,9]</sup> The margins were given to shift the demarcation of the prosthesis and tooth margins below the free gingiva. For this procedure, the double cord technique was used (#000 first cord and #00 second cord) (Ultrapak<sup>®</sup> knitted cord).<sup>[7,10,11]</sup> A master impression of the maxillary arch was made with a two-stage putty wash technique after a conservative gingival retraction procedure (Elite HD+, Zhermack<sup>®</sup>) [Figure 3].



**Figure 3:** Master impression of the prepared arches was made after a meticulous and conservative gingival retraction procedure with a two-stage putty wash technique (Elite HD+, Zhermack<sup>®</sup>) and monophasic impression (Zhermack Hydrorise<sup>®</sup>) of mandibular arch



**Figure 5:** Ceramic bisque trial with maxillary arch and teeth setting trial in mandibular arch

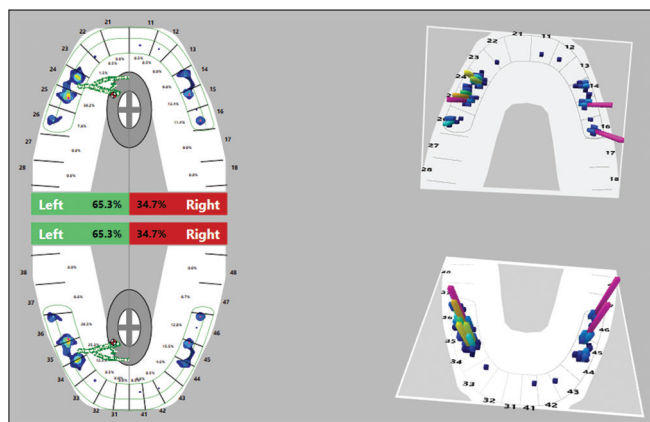


**Figure 4:** Metal coping trial in maxillary and hybrid framework trial in mandibular arch



**Figure 6:** Preoperative and postoperative intraoral frontal view of the patient

An open tray was fabricated for the mandibular arch and a monophasic impression (Zhermack hydrorise<sup>®</sup>) was taken by splinting the implants intraorally, with open-tray impression copings and using ligature wire and pattern resin (GC<sup>®</sup> pattern resin) [Figure 3]. A jig trial was done and intraoral periapical radiographs were taken to verify and correlate the position of implants in master cast and intraorally. A face-bow record (UTS (Universal Transfer System) 3D transfer system<sup>®</sup>) and jaw relation were obtained using wax occlusal rims and the existing



**Figure 7:** T-scan evaluation of the bisque ceramic trial showing nonuniform contacts that need to be equilibrated



**Figure 8:** Preoperative and postoperative extraoral frontal view of the patient smile



**Figure 9:** Preoperative and postoperative extraoral profile view of the patient smile

modified temporaries. According to the facial complexion and existing maxillary teeth, shade determination (VITA classic shade guide<sup>®</sup>) was done.

The design was fabricated with metal copings in the maxillary and hybrid metal framework in the mandibular arch using a manual casting technique. Metal coping trial was done and checked for the marginal fit of the maxillary arch and the jaw relation was verified for sufficient clearance for the ceramic layering [Figure 4]. Ceramic was layered using the teeth setting index initially obtained and adding staining characterization was required. A bisque ceramic trial was evaluated intraorally and was checked for occlusion in centric and eccentric movements (IPS Classic<sup>®</sup>) along with the mandibular teeth setting trial [Figure 5].

A group function occlusion scheme was given.<sup>[12,13]</sup> The occlusion was examined with T-Scan (T-Scan<sup>™</sup> Novus<sup>™</sup>) and group function occlusion was attained [Figure 7].<sup>[14]</sup> After a necessary evaluation, the prosthesis was finally glazed (25°C–500°C). Maxillary porcelain fused to ceramic prosthesis was cemented with glass-ionomer cement. Mandibular prosthesis was seated and each implant was torqued to 20 Ncm (according to the Straumann protocol). Prosthesis was cemented after sealing the abutment access channels with gutta-percha. The preoperative-to-postoperative rehabilitation showed a drastic difference [Figure 6]. The change from a preoperative-to-postoperative smile of the patient was satisfactory [Figures 8 and 9].

The patient was recalled for a recall after 1, 3, and 6 months. He was advised meticulous oral hygiene instructions using floss and brushing twice a day. The patient had a high score of 28 preoperatively and a low score of 10 [Table 1] suggesting an improvement in oral health-related quality of life using the Oral Health Impact Profile-14 questionnaire.<sup>[15-17]</sup>

Rehabilitating a patient with a single edentulous arch is challenging and requires careful treatment planning. Majority of these patients are socially affected by high esthetic and functional demands. Fixed rehabilitation of such patients is a tough call with appropriate dental material and would be a challenging choice for prosthesis. Our research and knowledge have resulted in high-quality publications from our team.<sup>[18-32]</sup> The appropriate treatment protocol for these patients not only satisfies their esthetic and functional demands but also gives better confidence in life.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and

**Table 1: The Oral Health Impact Profile-14 score in each domain for the patient in this case report**

OHIP-14 domains	Pretreatment score for each domain	Posttreatment score for each domain
Functional limitation	4	1
Physical pain	3	1
Psychological discomfort	6	3
Physical disability	2	2
Psychological disability	6	2
Social disability	4	1
Handicap	3	0
OHIP-14 score	28	10

OHIP-14: Oral Health Impact Profile-14

other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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