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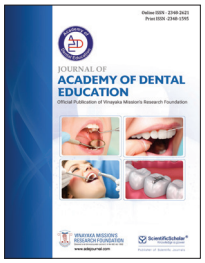

Case Report

Rehabilitation of completely edentulous patients with hybrid dentures

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ABSTRACT

Implant-supported hybrid dentures provide completely edentulous patients with the option of availing fixed complete denture prosthesis. Several factors need to be taken into consideration for selecting the patient for hybrid dentures. This study details the procedures involved in the construction of hybrid dentures for two completely edentulous patients with different systemic conditions.

Keywords: Implants, Edentulous, Jig trial, Hybrid denture, Treatment planning

INTRODUCTION

Dental implants are fixed dental prosthesis wherein a titanium screw is placed inside the jaw bone to anchor the dental prosthesis. They provide superior retention, stability, and support when compared to conventional dentures, and also improve masticatory functions and esthetics.[1,2] Hybrid dentures are complete dentures that are fixed in the mouth using dental implants. This overcomes the disadvantages of removable dentures which have to be frequently removed for cleaning. They comprise of acrylic resin teeth and denture base that are attached to a metal framework that connects the implants. This type of fixed prosthesis is called FP3-type prosthesis.[3] Unlike in conventional dentures, the flanges do not extend up to the vestibule. They stop at the attached gingiva region and, hence, are more comfortable for the patient.

Hybrid dentures provide excellent retention which allows them to resist the displacing forces. As masticatory forces are directed toward the alveolar bone, it has a stimulatory effect which significantly delays resorption.[4] Esthetics, taste perception, and phonetics are also better when compared with the conventional complete dentures as the denture does not cover the palatal surface.[5]

However, the common drawbacks of hybrid dentures include entry of food beneath the intaglio surface of the dentures causing discomfort. Therefore, proper maintenance of oral hygiene is essential. Furthermore, complications during surgery, implant loss, loss of bone structure, peri-implantitis, and occasional loss of stability and anchorage may be seen. Such complications are affected by several factors such as the operator's skills and decisions in the treatment planning, implant design, and patient associated factors such as local and systemic conditions.[6]

Herein, we describe the fabrication of hybrid dentures for the treatment of two patients who reported with a chief complaint of desire to replace their missing teeth in their upper and lower arches.

CRITERIA FOR SELECTING CASES FOR IMPLANT SUPPORTED HYBRID DENTURE

The bone density in the anterior maxilla of D2 or D3, posterior maxilla-D3 or D4, anterior mandible-D1 or D2, and posterior mandible of D2 or D3 type is ideal. Local and systemic factors such as diabetes mellitus, periodontal disease, and poor oral hygiene affect the prognosis negatively. Interarch space of at least 12 mm in the anterior and posterior regions is necessary.

TREATMENT PLAN AND DURATION

Treatment plan consists of two stages. In Stage 1, evaluation with diagnostic imaging using orthopantomogram (OPG), cone-beam computer tomography (CBCT), and diagnostic models is done. This is followed by deciding the number of implants to be placed, implant design, and form. The patient's previous dentures can be used as surgical guides during the implant placement.

Healing is based on the bone density and the torque when the primary stability of the implant is achieved. For patients with adequate bone density and primary stability, healing and osseointegration can be observed in 3–4 months. This is followed by Stage 2 prosthetic rehabilitation. Both the patients' consents for treatment as well as for using their clinical and radiographic images for educational and scientific purpose were obtained.

CASE REPORT

Case 1

A 40-year-old female patient with good systemic health reported with the complaint of complete edentulousness of maxilla and mandible. Intraoral conditions were favorable and hybrid dentures were the best treatment option for this patient.

Investigation

Pre-operative investigation was done using CBCT and radiographs. Diagnostic models were then fabricated.

PRE-OPERATIVE PHOTOGRAPHS [FIGURE 1]

Step 1 - Implant placement

CBCT was taken with the patient wearing her previous dentures having a radiopaque material (gutta-percha) filled in the central fossa of the teeth so as to act as surgical guide. This guides the proper placement and positioning of the surgical drills and subsequently, the implant pre operative photograph positioned before step 1.

Noble active implants were used due to their extensive data of ADA certification and reliable quality. Six implants were placed in the upper arch – according to the implant system, four were of regular platform (RP) (color coded – yellow) of 11.5 mm placed in the anterior maxillary region of 14, 12, 22, and 24, and other two were wide-platform implants (WP) (color coded – blue) of 10 mm in the 16 and 26 regions. Four RPs were placed in the lower arch in the interforaminal (mental foramen) region. In this case report, we discuss only the prosthetic aspects of the hybrid dentures.

Step 2

Three months after implant placement, an OPG was taken to confirm good healing and osseointegration. Subsequently, the mucosal flap over the implant was reflected and the cover screws were removed to expose the implant platforms. Healing caps were placed, around which the gingiva healed [Figure 2a]. Non-absorbable sutures were placed and the patient was asked to report back after 1 week for suture removal.

Step 3

After 1 week, the sutures were removed and primary impression was made with alginate impression material using a stock tray [Figure 2b and c]. On the model obtained from this impression, a special/custom tray was fabricated using self-cure denture base resin for recording the functional impression by open-tray technique.

Step 4

A custom tray was fabricated with windows created in the areas where the abutments are positioned. In the following

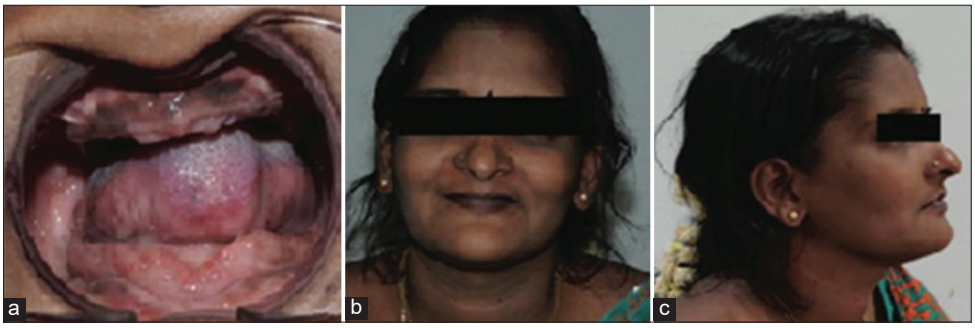

Figure 1: (a) Pre-operative intraoral picture and (b and c) patient's pre-operative frontal and lateral profile.

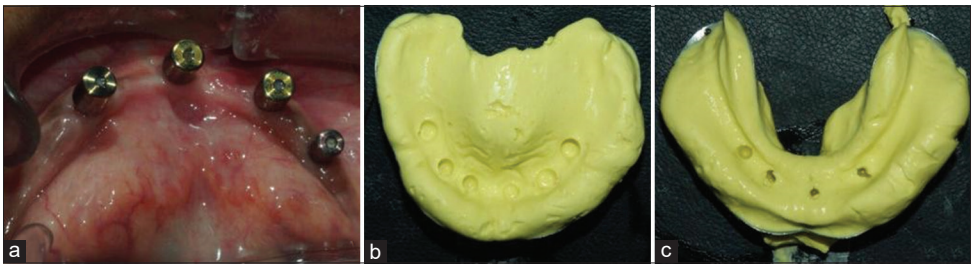

Figure 2: (a) Healing cap placed and (b and c) primary alginate impression.

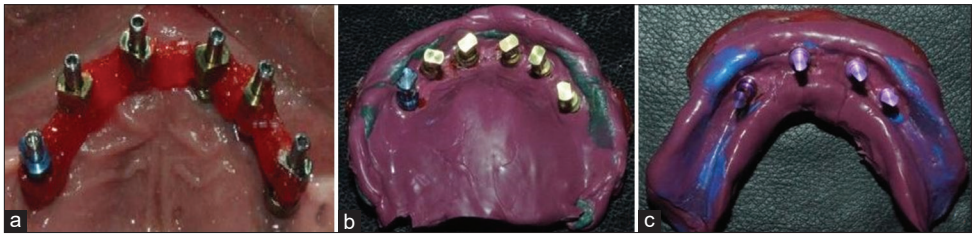

Figure 3: (a) Open-tray copings connected using GC pattern resin and (b and c) secondary impression.

appointment, the healing caps were removed and open-tray copings were placed on the implant platforms. The copings were then connected using a ligature wire and stabilized by placing GC pattern resin over it [Figure 3a]. This was done to prevent their displacement and maintain their orientation with each other when the secondary impression is made.

Border molding was done with medium body silicone material (Zhermack) after applying tray adhesive on the special tray. The open tray was then loaded with monophase elastomeric impression material (Zhermack) for better accuracy and secondary impression was made. Care was taken to expose the screw heads of the open-tray abutments through the wax floor of the open tray during the impression procedure for easy removal of the impression along with the embedded abutments [Figure 3b and c].

Step 5

The transfer copings/laboratory analogs, which simulate the implant in the patient's mouth, were placed on the abutments. This helps in replicating the exact location and orientation of the implants in the patient's mouth on the model, which subsequently aids in the construction of a properly fitting prosthesis. The models were then poured with dental stone.

Step 6

In the next appointment, intraoral jig verification was done to check the correct seating of the copings in the patient's mouth as seen in the model. It was done using implant verification jigs attached together using GC pattern resin and placed intraorally [Figure 4a and b]. The sequential tightening of the

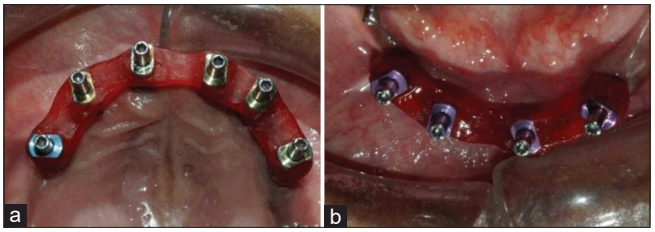

Figure 4: (a and b) Jig verification.

abutments on the implant platforms was determined in this step. Corrections were made till proper seating was achieved. The proper seating of the jig on the implant surface was verified radiographically.

Step 7

Occlusal rims were fabricated with modeling wax to record the maxillomandibular relationship and fabricate the trial dentures [Figure 5a]. Jaw relation was recorded and facebow transfer was done using earpiece type of arbitrary facebow [Figure 5b]. The models were then articulated [Figure 5c] and arrangement of the prosthetic teeth was done. The trial dentures were then fitted intraorally and adjustments were made [Figure 5d].

The metal framework was fabricated from the wax pattern and try-in was done to check the fit [Figure 5e and f]. This is preferably done before occlusal rim fabrication for esthetic purpose so as to ensure proper teeth arrangement and prevent any composite resin exposure on the buccal surface in the final prosthesis. Following this step, the processing of the final denture was done using injection molding technique.

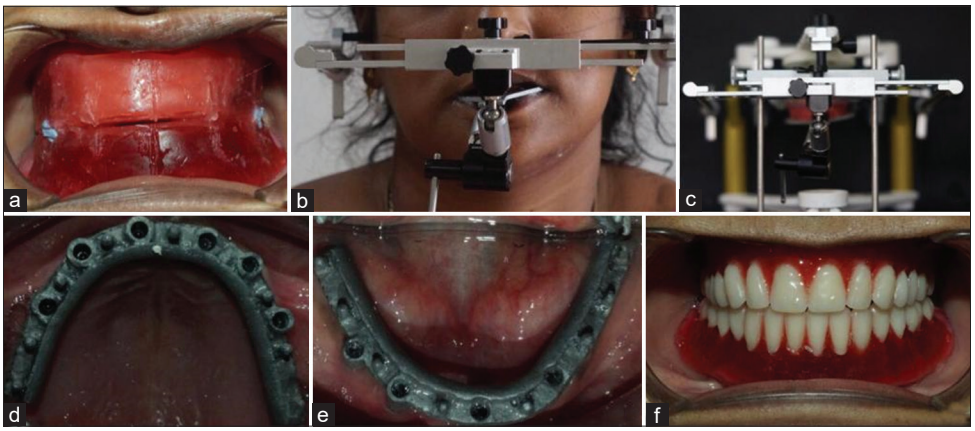

Figure 5: (a) Occlusal rims, (b) jaw relation, (c) articulation, (d) trial denture, and (e and f) metal framework.

FINAL PROSTHESIS AND POST-OPERATIVE PHOTOGRAPHS [FIGURE 6]

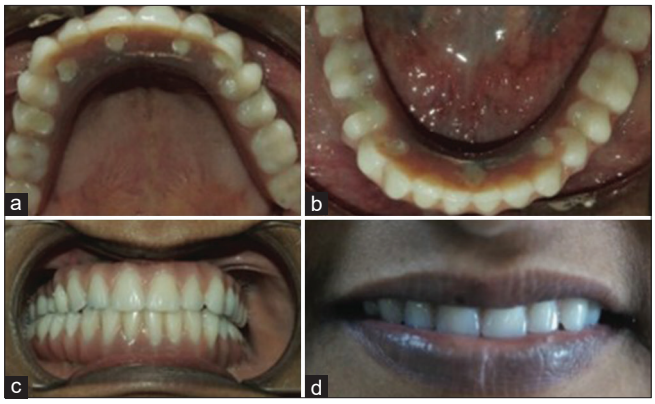

Figure 6: (a-c) Fitted final prosthesis and (d) Patients post-operative photograph.

Case 2

A male patient aged about 70 years reported with a chief complaint of complete loss of teeth in upper and lower arches and expressed his desire to have fixed prosthesis. The patient was previously using removable complete dentures. He had favorable intraoral conditions, good systemic health and was indicated for treatment using hybrid dentures (FP-3 type implant prosthesis). He had hypertension and was under medication due to which his blood pressure parameters were favorable for surgical placement of implants. The treatment plan was explained to the patient and initial investigation was done using CBCT, radiographs, and diagnostic models.

PRE-OPERATIVE PHOTOGRAPHS [FIGURE 7]

Step 1 - implant placement

The removable complete dentures that the patient was initially using were used as the surgical guides to place six implants (noble active implants) in the maxilla (four RP and two WP) and four RP type implants in mandible in the interforaminal region.

Figure 7: Pre-operative profile photograph.

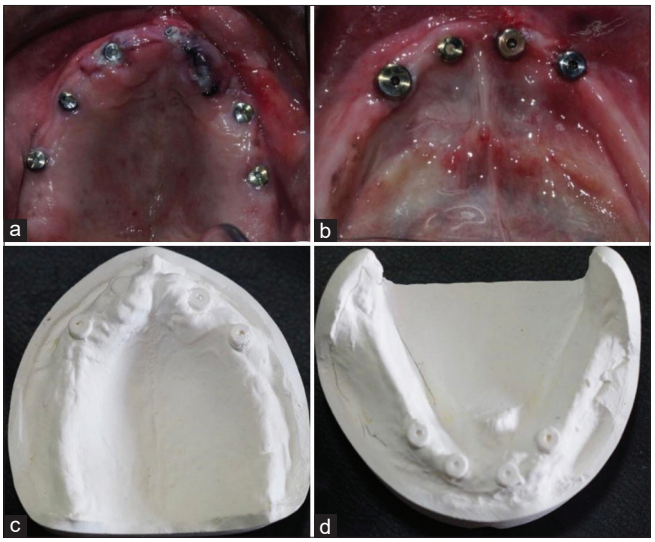

Figure 8: (a and b) Implant with healing cap and (c and d) primary models.

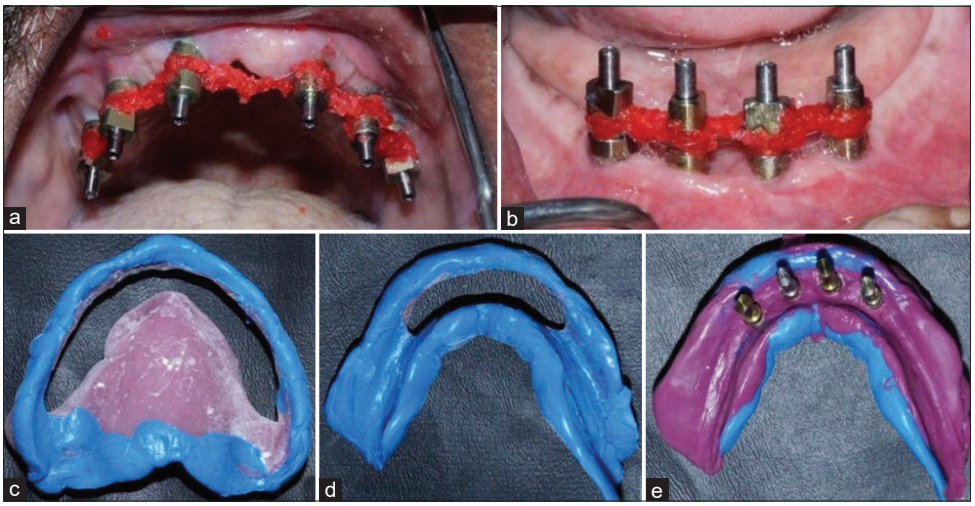

Figure 9: (a and b) Open-tray copings connected using GC pattern resin, (c and d) border molding done using custom tray, and (e) secondary impression.

Step 2

Three months following the implant placement, an OPG was taken to confirm good healing and osseointegration. After this, flap reflection was done to expose the cover screws, which were then replaced with healing caps [Figure 8a and b]. Non-absorbable silk sutures were placed and the patient was asked to report after a week for suture removal and for recording the impression.

Step 3

Primary impression was taken using a stock tray and elastomeric alginate impression material. Primary casts [Figure 8c and d] were poured using dental plaster for fabrication of the special tray.

Step 4

Special tray (open tray) was fabricated for taking the secondary impression using denture base resin. Windows were made in the areas where the implants were placed.

Step 5

To prevent displacement of the abutments while making the functional impression, the healing cap was removed and open-tray copings were placed on the implants. These copings were connected to each other using ligature wires and stabilized using GC pattern resin [Figure 9a and b]. These transfer copings help in maintaining proper positioning and in achieving accurate fit of the dentures. Border molding was done using medium body silicone material (Zhermack) using tray adhesive [Figure 9c and d].

Step 6

The open tray was then loaded with monophase impression material (Zhermack) and secondary impression was recorded [Figure 9e]. The laboratory analogs or transfer copings were placed on the impression and the model was poured so that the copings are embedded in the model. This perfectly replicates the intraoral location of the implants on the cast.

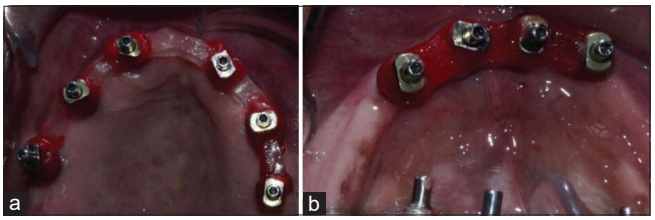

Figure 10: (a and b) Jig verification.

Step 7

Using implant verification jig [Figure 10a and b], the fit of the framework to the abutment is checked and necessary adjustments were made before it was sent to the laboratory for fabricating the metal framework.

Step 8

After this, the occlusal rims [Figure 11a] were fabricated with modeling wax and placed in the patients mouth to record the jaw relation [Figure 11b]. This was followed by articulation and teeth arrangement.

Step 9

Trial denture after teeth arrangement was placed in the patient's oral cavity to check the proper fit [Figure 11c]. After ensuring the patient's satisfaction with the esthetics, the denture was processed.

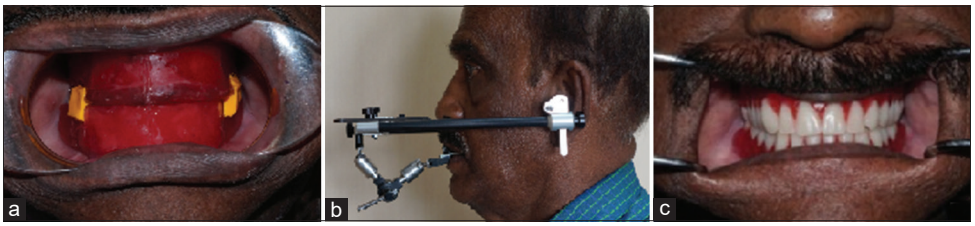

Figure 11: (a) Occlusal rims, (b) jaw relation, and (c) trial denture.

FINAL PROSTHESIS AND POST-OPERATIVE PHOTOGRAPH [FIGURE 12]

The patient was satisfied and comfortable with the final fixed prosthesis. He did not have any complaints on esthetics or function.

Figure 12: (a) Final prosthesis and (b) post-operative photograph.

1-YEAR FOLLOW-UP RADIOGRAPH [FIGURE 13]

The one year post operative follow up of the patient's OPG showed considerably good amount and quality of bone surrounding the implant. There was no complications involved.

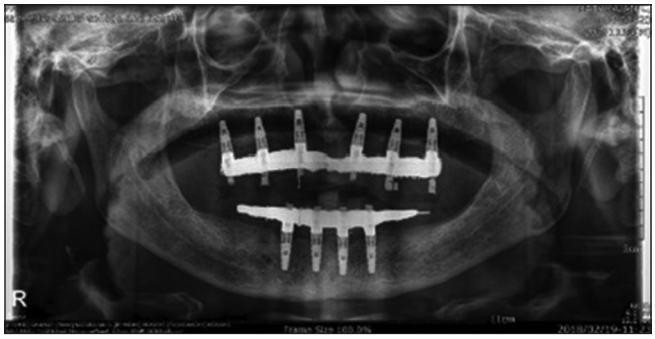

Figure 13: One-year post-operative orthopantomogram with the framework.

CONCLUSION

The fabrication of hybrid dentures for replacing missing teeth in completely edentulous patients results in an improvement in the quality of life of these patients. The excellent clinical outcome, determined by good esthetics, comfortable functional results, and long-term survivability of the prosthesis, is a result of careful diagnosis, case selection, treatment planning, and treatment execution.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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