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CASE REPORT

Implant and Tooth Supported Full-Mouth Rehabilitation with Hobo Twin-Stage Technique

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ABSTRACT

The dilemma confronting many dentists today is that innovations have greatly enlarged the treatment realm for tooth preservation as well as tooth replacement. The objectives should not only be preservation of the remaining tooth structure, restoration of optimum function, esthetics and cost effectivness but also there may be a positive psychological impact for the patient. This case report demonstrates a satisfying full-mouth rehabilitation using the Hobo and Takayama twin-stage procedure including tooth and implant-supported prosthesis for a patient with esthetically and functionally compromised dentition.

Keywords: Full-mouth rehabilitation, Hobo twin-stage procedure, Condylar guidance, Incisal guidance, Cuspal angulation, Balanced occlusion, Disocclusion.

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INTRODUCTION

The personality of an individual is often judged by his looks. However, the personality may be falsely interpreted by ugly and impaired teeth. The term 'full-mouth rehabilitation' is used to indicate extensive and intensive restorative procedures in which the occlusal plane is modified in many aspects in order to accomplish 'equilibration'.

In order to provide posterior disocclusion during mandibular excursion, the cusp angle should be shallower than the condylar path. However, in reality, it is difficult to create this in a restoration. To make a shallower cusp angle in a restoration, it is necessary to wax the occlusal morphology to produce balanced articulation. Since anterior teeth help to produce disocclusion, when we wax the occlusal morphology, the anterior portion of the working cast becomes an obstacle. To compensate this, the cast with a removable anterior segment is fabricated. In Hobo twin stage technique, we first reproduce the occlusal morphology of posterior teeth without the anterior segment and produce a cusp angle coincident with the standard values of effective cusp angle (referred to as 'condition 1'). Thereafter, we reproduce anterior morphology with the anterior segment and provide anterior guidance which produces a standard amount of disocclusion (referred to as 'condition 2').[1]

CASE REPORT

A 39-year-old female reported to the outpatient department of prosthodontics, with a chief complaint of worn out dentition with some missing teeth and unable to chew. She also complained of unesthetic appearance and collapsed face. The patient gave a dental history of implant placement in upper and lower arches 6 months back. Radiographs and diagnostic impressions were made. Intraoral examination revealed the generally attrited and partially edentulous upper and lower arches (Figs 1A to C). On radiographic examination, it was found that the patient had implant placed in the region of 16, 22, 23, 34 and 46 (Fig. 1D).

Dental records of the patient were checked and it was found that all implants were of the diameter 3.75 mm and length 10 mm. Abutments were placed for all the implants in stage II surgery.

Evaluating the speech and phonetics of the patient, it was planned to raise the vertical dimension of occlusion of the patient by 2 mm and she would be rehabilitated with full mouth fixed prosthesis following the Hobo twin-stage procedure.

Diagnostic casts of the patient was made, facebow transfer of the patient was done and a Broadrick occlusal plane analyzer was customized on a semi-adjustable (Whip Mix) articulator to determine the correct orientation of occlusal plane.

Next, mock preparation of all the upper and lower teeth was done followed by diagnostic wax-up. During wax-up, the curve of spee was analyzed from the Broadrick's point obtained[2] (Figs 2A and B).

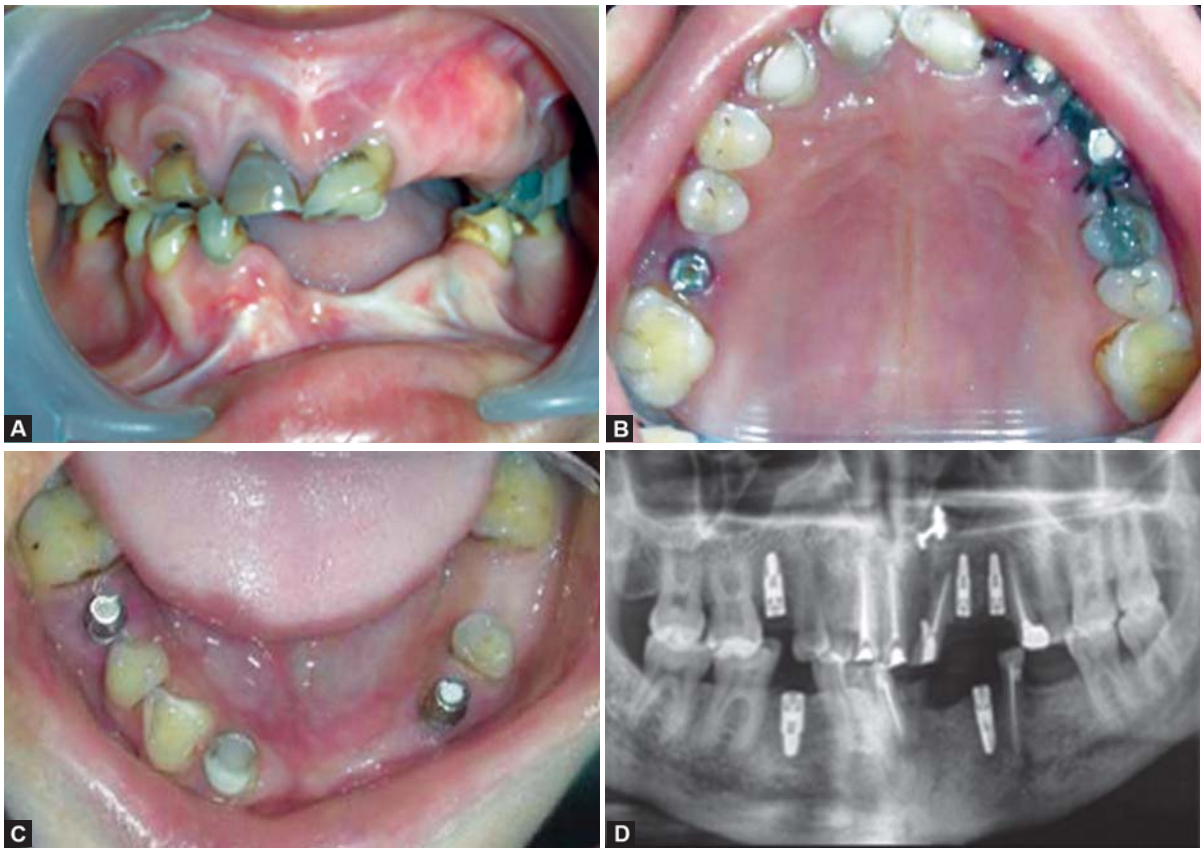
In the next two visits, tooth preparation of all the upper and lower teeth was completed followed by centric bite registration record and final impression.

This was followed by provisionalization with the help of the putty indices made from the diagnostic wax-up and a facebow transfer.

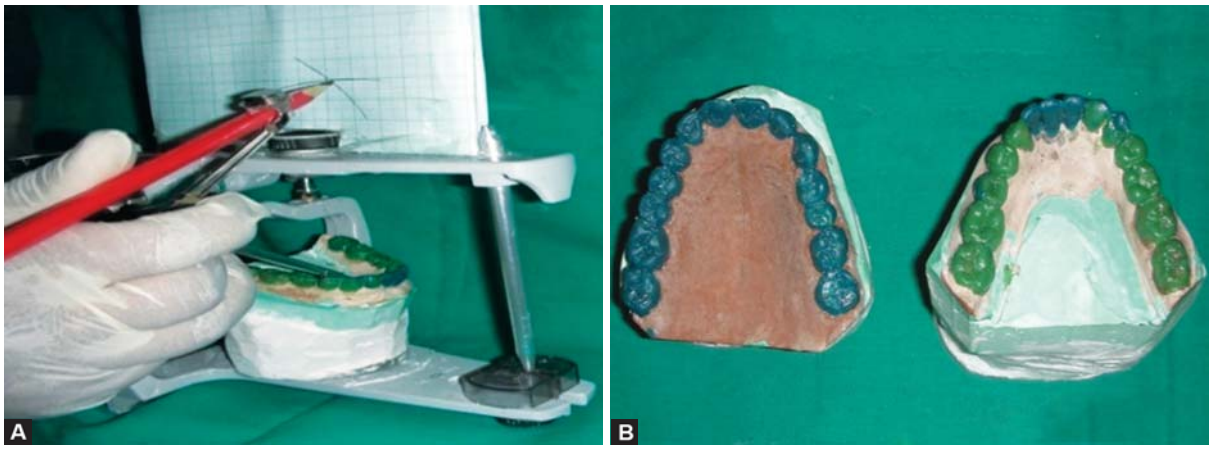
The Hobo Twin-Stage Condition 1 (Table 1)

This stage aims at achieving a balanced occlusion so that we can achieve a cuspal angulation of 25°. The anterior segments of upper and lower casts were removed and wax-up of the posterior teeth was done, and cast in nickel chromium alloy and coping trial was done (Figs 3A to C).

The metal copings were placed on the articulator, and balancing was done simultaneously with ceramic firing (Figs 4A and B).

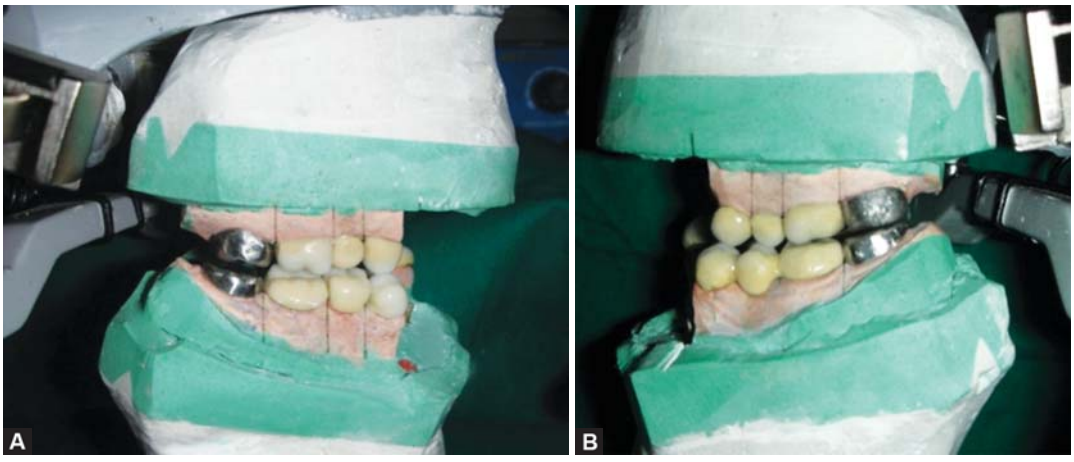


Figs 1A to D: (A) Preoperative intraoral view, (B) intraoral view of maxillary arch after stage II surgery, (C) intraoral view of mandibular arch after stage II surgery, (D) preoperative radiographic view



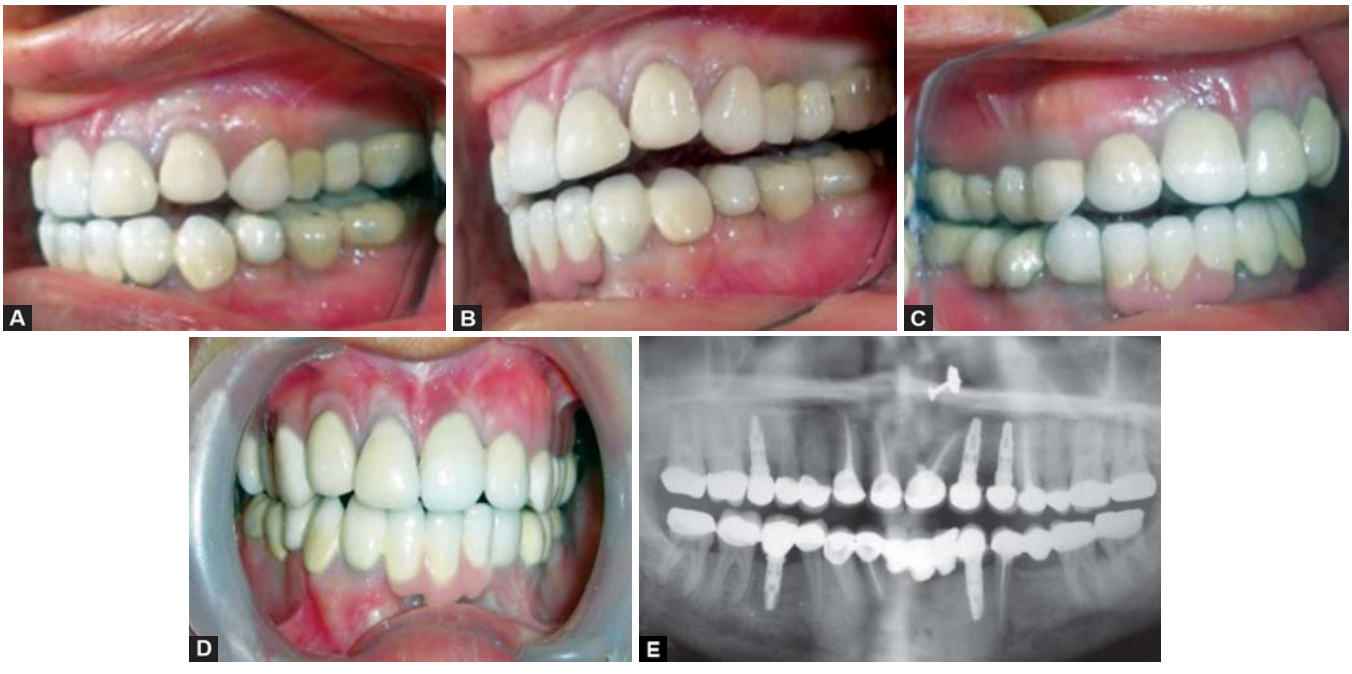
Figs 2A and B: (A) Broadrick's plane analysis, (B) diagnostic wax-up

Figs 3A to C: (A) Posterior wax-up for coping, (B) coping trial in maxillary posteriors, (C) coping trial in mandibular posteriors



Figs 4A and B: (A) Balancing after ceramic firing (right side), (B) balancing after ceramic firing (left side)

Figs 5A to C: (A) Non-rigid connector made in #33, (B) coping trial of anterior teeth, (C) non-rigid connector after ceramic firing



Figs 6A to E: (A) Posterior disocclusion during protrusion, (B) disclusion in non-working side, (C) disclusion in working side, (D) postoperative view, (E) postoperative radiographic view

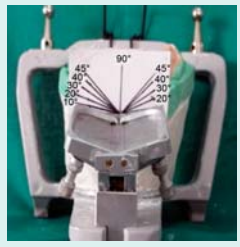
The goal of achieving cuspal angulation of 25° which is a requisite for condition 2 was thus accomplished.

The Hobo Twin-Stage Condition 2

Now, the anterior segments were reassembled and the articulator was adjusted to the values according to Table 1.

Wax-up of the anterior tooth was done and cast in nickel chromium alloy. Coping trial was done. During wax-up of the implant abutment in the #33 region, a non-rigid connector was given on the mesial side of the abutment, so as to decrease the forces being exerted upon the abutment[3,4] (Figs 5A and B).

Table 1: Articulator settings in conditions 1 and 2 as per Hobo and Takayama technique

Conditions	*Condylar path*		*Anterior guidance table*	
	Sagittal condylar path	Bennett angle	Sagittal inclination	Lateral wing angle
Condition 1 (without anterior teeth)	25	15	25	10
				
Condition 2 (with anterior teeth)	40	15	45	20
				

The palatal contours of maxillary anterior teeth and the incisal edges of mandibular anterior teeth were fired with ceramic such that the incisors contacted during protrusive movement and canine on the working side contacted during lateral movements. The finished units were then tried onto the patient and intraoral adjustments made prior to glaze and cementation (Fig. 5C).

Protrusive movement showed a posterior disocclusion of approximately 1 mm, lateral movements on both sides showed a disocclusion of 1 mm on the nonworking sides and 0.5 mm on the working side. Following occlusal adjustments, the metal ceramic restorations were glazed and cemented (Figs 6A to E).

DISCUSSION

Function and health can be restored for worn out dentition using Hobo twin-stage procedure. There has been conflicting opinion whether to work simultaneously or to work on different segments of the arch individually. The proponents of the latter theory states that work can be completed more quickly and easily and with much more comfort for the patient.[5] The total chair time and laboratory time for rehabilitation is significantly reduced. The disadvantages include restrictions for achieving ideal occlusion when altering the vertical dimension, occlusal plane. Dawson stated that the condylar path was not a determination of anterior guidance, and that it did not matter whether the anterior path was flat, curved, concave, convex or parabolic, the rotating condyle sliding down the unchanged condylar paths permits the lower anterior teeth to follow any number of path variations without interference.[2]

According to an investigation on molar disocclusion during eccentric movements, the amounts of disocclusion were 1.1 ± 0.6 mm during protrusive movement and 0.5 ± 0.3 mm on the working side and 1.0 ± 0.6 mm on the non-working side during lateral movement measured at the mesiobuccal cusp tip of the mandibular first molar.[1] The actual disocclusion on the working side (0.5 mm) was equal to the amount created by the angle of hinge rotation (0.5 mm). However, the actual disocclusion during protrusive and lateral movements on the non-working side differ from the angle of hinge rotation. This leaves residual amounts of disocclusion unaccounted suggesting that the angle of hinge rotation was not solely responsible for disocclusion.[6] The residual amounts can also be attributed to the cusp shape factor.

CONCLUSION

The ultimate goal of the restoring prosthodontist is to harmonize the occlusion with the stomatognathic system. Varied approaches to this goal are reported in the literature. Hobo and Takayama have proposed one such method for restoring the worn out dentition with provision for a controlled and planned amount of disocclusion during protrusive and lateral movements of the mandible, while ensuring a functional balance when the teeth are brought

into intercuspation. This case presented illustrates this philosophy of occlusal rehabilitation.

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