

FULL MOUTH REHABILITATION OF THE PATIENT WITH SEVERELY WORN DENTITION USING A TWIN STAGE PROCEDURE : A CASE REPORT

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The gradual wear of the occlusal surfaces of teeth is a continuous phenomenon. Excessive occlusal wear may lead to occlusal disharmony, pulpal trauma, esthetic disfigurement, and impaired function. Management of tooth wear is challenging in preventive and restorative dentistry. Correct assessment of occlusal vertical dimension, interocclusal rest space, and centric relation records are critical for successful treatment. Innovations and well-defined specializations have widened the treatment realm for tooth preservation as well as tooth replacement. The treatment of these patients is complex, There are vital guidelines that can help to achieve a successful outcome.

Anterior guidance is crucial in human occlusion because it influences molar disocclusion that controls horizontal forces. Molar disocclusion is determined by a cusp-shape factor and an angle of hinge rotation¹. The three factors which determine disocclusion are: condylar path, incisal path and cusp angle. Hobo and Takayama stated that, "the condylar path shown to have deviation within the individual and its influence on disocclusion is minimal".²

This article presents prosthodontic rehabilitation of a patient with multiple missing teeth, severely worn dentition and uneven occlusal plane has been treated using twin stage procedure.

Case report

A 71 year old male reported to the Department of Prosthodontics, Mahe Institute of Dental Sciences, Mahe with a chief complaint of multiple missing teeth and severe wear of dentition since few years which is getting deteriorated over a period of time. Patient was hypertensive and on regular medication since 10yrs (Cilacar 10mg)

Clinical examination

Extraoral examination shows facial asymmetry with more muscle development on left side of face. Well developed (Class 1) Masseter. Brachycephalic head and Euryprosopic face. No abnormality in the TMJ.

Intraoral hard tissue examination shows Mild calculus and stains. Generalised attrition. Bony

exostoses and cervical abfractions. Alveolar bone buttressing Teeth missing :36,37,47 Fractured amalgam restoration on 35

Supra-eruption of 17,18,27,28. Tenderness on percussion :14, Secondary caries :14 Edge to edge bite. Soft tissue examination shows Generalized periodontal pockets with average probing depth of 4mm. Mild gingival enlargement in relation to upper & lower anteriors (drug induced). Evaluation of edentulous ridge : Siebert's classification Class II. Generalised gingival recession.

Diagnosis:

Excessive wear without loss of vertical dimension of occlusion but with space available (Turner and Missirlain Category 2)

The case was taken for the following objectives of treatment to:

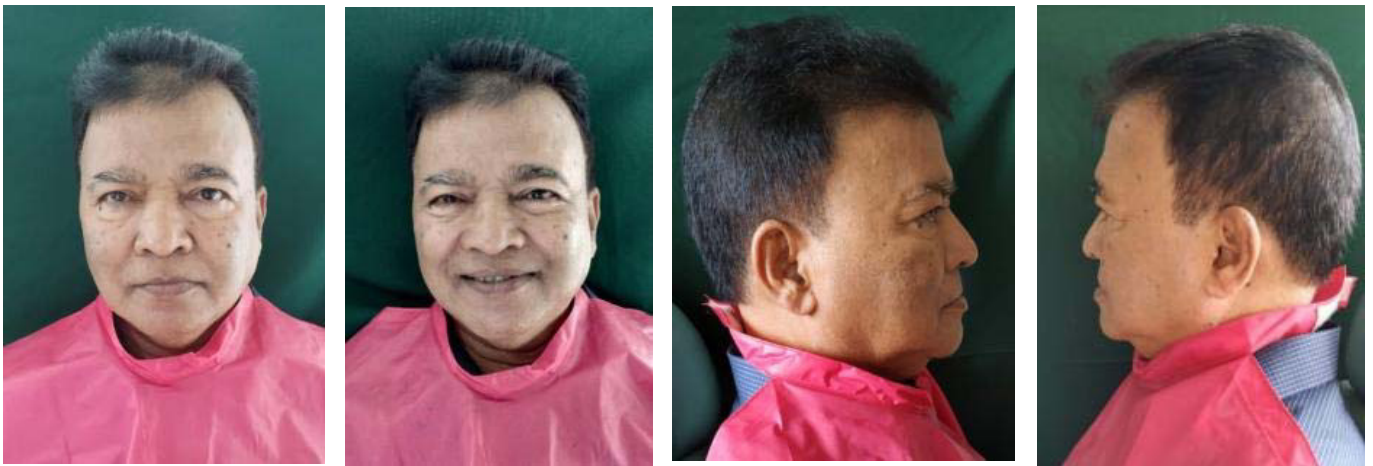
- Attain functional harmony
- Reestablish form, function, and esthetics
- Establish a canine-guided occlusal scheme.

Treatment procedure

A heat cure clear acrylic occlusal splint of 3 mm was given to the patient for 6 weeks. The adaptation of the patient to the increased VDO was evaluated during 2-month trial period. Muscle tenderness and temporomandibular discomfort were not found.

Pre-prosthetic phase

1. Extraction of 14,17,18,28,38 and Root canal treatment of of 13,12,24,25 26,36,35,34,33,32,42,43



Frontal and lateral profile views



Severe attrition of maxillary and mandibular anteriors



Pre-op OPG

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was performed. Functional crown lengthening of 15,16,45,46. Aesthetic crown lengthening along with gingivoplasty in relation to 13,12,11,21,22,23. Gingivoplasty in relation to 33,32,31,41,42,43. Implant was placed in relation to 36 and 37 Size 4.2×10 & 3.75×10 (Adin System).

Prosthetic Phase

The diagnostic impressions were made using irreversible hydrocolloid. The patient’s casts were mounted on a semiadjustable articulator (Hanau H2) using a facebow record at increased VD. Mandibular occlusal plane was analysed using

the Broadrick’s occlusal plane analyzer. Divider of Broadrick occlusal plane analyzer was opened at 4 inches and a mark was obtained on the flag by keeping one end at the distal end of the canine and the second end of the divider at the distobuccal cusp of the last molar and another mark crossing the first one was obtained. Now, another end of the divider was kept on this intersection of the marks, and occlusal plane was marked on mandibular canine.³ Occlusal equilibration was done in the patient’s mouth by removing the occlusal interferences, so that centric relation coincided with the maximum intercuspal position.



A surgical guide was made using thermoplastic material and inserted into the mouth to mark the bleeding points



Esthetic Crown Lengthening along Gingivoplasty 33, 32, 31, 41, 42, 43 with Gingivoplasty 12,12,11,21,22,23



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Values of conditions 1 and 2 according to Hobo twin-stage technique (values in degrees)

	Horizontal condylar guidance	Lateral condylar guidance	Anterior guidance	Lateral anterior guidance
Condition 1	25	15	25	10
Condition 2	40	15	45	20

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The semiadjustable Hanau articulator was programmed to Condition 1 of Hobo's twin-stage procedure wherein after removal of the maxillary anterior segment, posterior segment diagnostic wax-up was done in bilaterally balanced occlusion. The settings were changed to Condition 2 where the maxillary anterior segment was replaced and the anterior wax-up was completed and checked for proper anterior guidance to achieve disocclusion in eccentric movements due to canine-guided occlusion. Provisional crowns were fabricated with autopolymerizing resin using a vacuum-formed

matrix produced from the diagnostic wax-up.

The interim restorations were kept for 45 days to assess the patient's adaptation to the proposed new occlusal scheme and vertical dimension of occlusion, which was raised by 3 mm. Once the patient was satisfied with temporary restorations, the definitive cast was fabricated. After die cutting, the casts were

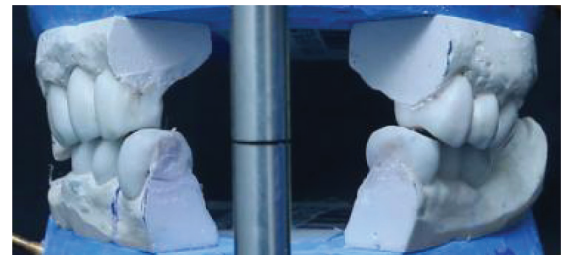
mounted on semiadjustable articulator. The wax patterns were fabricated, invested, and casted. The metal copings were retrieved and metal try-in



Face bow transfer and Centric bite registration using Lucia-jig



Customized Brodrick's Occlusal plane Analysis



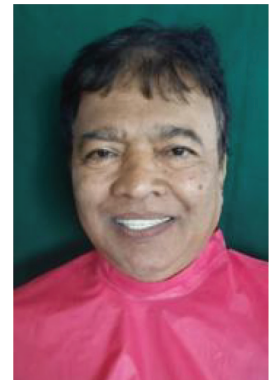
Wax mock-up with raised vd of 2mm + 2mm



Canine guided occlusion (temporaries)



Completed teeth preparation of maxillary and mandibular arches



Provisional restorations

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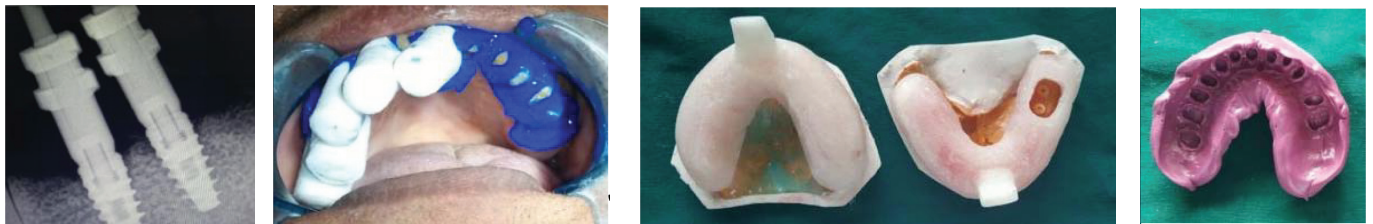
was done after finishing. After the metal try-in, the ceramic was applied and bisque try-in was completed. Porcelain-fused-to-metal restorations were made using Condition 1 and 2 of Hobo's technique. The canine-guided occlusion was checked in the mouth, and after verification, the crowns were cemented with temporary polycarboxylate cement. After 2 weeks, once the patient was comfortable, all the crowns were cemented with resin-modified glass ionomer cement (FujiCEM; GC America, Alsip, USA). Postoperative orthopantomogram was taken, and oral hygiene instructions and regular checkup were administered. The final prostheses were fabricated on the definitive cast by using the same values that were used to fabricate temporary prosthesis. The porcelain fused to metal restoration was corrected for occlusal prematurity in the mouth and it was finally cemented. On frequent recalls, patient gave satisfactory reviews with the treatment which was provided.

Discussion

Rehabilitation of patients with compromised dentition is a challenge in terms of establishing function and aesthetics for the patient⁴. Thorough examination diagnosis, and choice of appropriate occlusal scheme are the key to successful prosthodontic rehabilitation.⁵ All our efforts for full-mouth rehabilitation are directed toward reestablishing a state of functional efficiency, in which the hard and soft tissues of the stomognathic system function in synchronous harmony⁶. Dawson stated that interocclusal space is never lost and any loss is compensated by tooth eruption, alveolar bone expansion, and muscle action. Success in maintaining severe wear cases depends on the development of proper incisal guidance to allow for proper disocclusion within patient's envelop of motion^{6,7}.

The etiology of tooth wear is multifactorial, and clinical controlled trials of restorative and prosthodontics approaches are limited in quantity and quality.⁶ The VD should be raised with

Final impression made after one month



open tray impression coping Gingival retraction using magic foam inserted in relation to 36,37

Fabrication of custom tray



Final impression made in monophasic impression material Facebow transfer and centric bite registration

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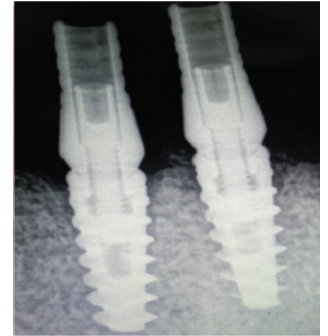
occlusal splints before starting the treatment, and the overlay prostheses should be tried between 3 weeks and 5 months for deprogramming of temporomandibular joint.⁸

The severe wear of anterior teeth facilitates the loss of anterior guidance, which protects the posterior teeth from wear during excursive movements. Collapse of posterior dentition results in loss of normal occlusal plane and decreased vertical dimension⁸

The incorporation of posterior disocclusion avoids harmful lateral forces as suggested by Hobo. In the twin stage procedure, as cusp angle was the main determinant of occlusion; the need to record condylar path was not necessary.⁶ Therefore, complicated instruments, such as the pantograph and fully adjustable articulators are not required. This procedure is much simpler than the standard gnathological procedure, yet it follows gnathological principles¹².



Die sectioning of the master cast



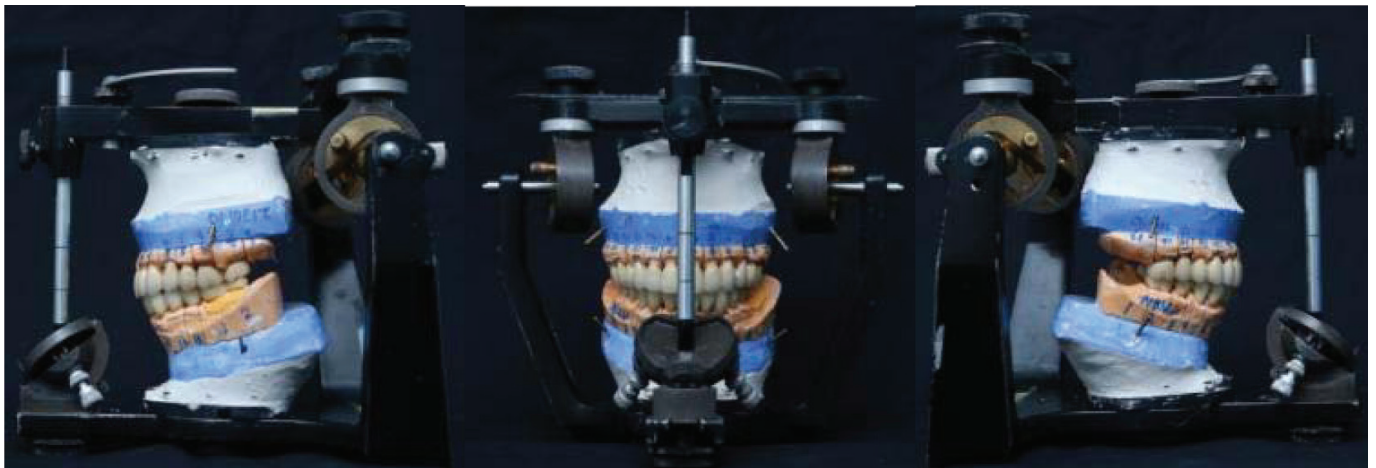
Jig trial of implants in relation to 36 and 37



Metal try-in



Fabrication of posterior restorations



Fabrication of anterior restorations

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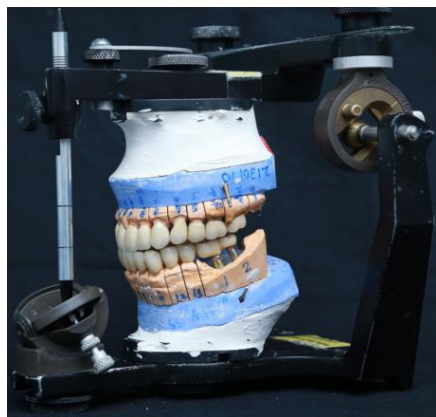
As was stated by D Amico, cuspid protected occlusions and disocclusions were natural adaptations which were used for preventing destructive occlusions¹³. Stuart and Stallard in 1957 said that the cuspid protected occlusion concept had many advantages over the group function. Hobo and Takayama said that amount of disocclusion depends on the condylar path, incisal path, and the cusp angle.² Posterior disocclusion is

very important in controlling harmful lateral forces. This case has demonstrated that if the condyles are seated in centric relation, additional restorative required space may be obtained. Proper anterior guidance not only is essential for preventing the interferences in the condylar envelop of movement but also prevents the excessive wear.⁶

Hobo and Takayama studied the influence of



Canine-guided disocclusion in lateral excursions



Posterior disocclusion during protrusion



Before

After



Cementation of final restorations

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condylar path, incisal path, and the cusp angle on the amount of disocclusion and concluded that cusp angle was the most reliable determinant of occlusion.² The twin-stage procedure helps in achieving a standard disocclusion of 1.1 mm on protrusion, 1 mm on nonworking side, and 0.5 mm on working side in eccentric movements at 3-mm protrusion from centric relation.⁶ However, if the sagittal condylar path of the patient is steeper than the articulator adjustment values (40°), disocclusion increases. If the path is less than 40°, then the amount of disocclusion decreases.² If the patient has less than 16° sagittal condylar inclination (only about an 8% occurrence rate), cuspal interferences will occur. If the incisal path is more than 5° steeper than the condylar path, patients complain of discomfort.^{8,9} Abnormal curve of Spee and Wilson, abnormally rotated teeth, and inclined teeth are contraindications of this technique¹⁴

The choice of restoration in this case was porcelain fused to metal as this would double the mechanical durability, recover esthetics, and protect the residual dentin.^{15,16}

Conclusion

Proper diagnosis and multidisciplinary treatment planning with adequate knowledge and judgement are paramount for success. This technique relies on the factor of cuspal angle and it uses the standard values which are proposed in the twin stage technique, to achieve a centric occlusion and an excursive disocclusion.

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