

Full Mouth Rehabilitation with Monolithic Zirconia Using Hobo's Technique: A Case Report

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ABSTRACT

Background: Prosthodontic management of occlusal wear problems is a demanding task on the part of the prosthodontist. Various factors such as vertical dimension of occlusion, centric relation, occlusal contact pattern, esthetics and phonetics need to be considered simultaneously for both anterior and posterior teeth during occlusal rehabilitation. This may be further complicated by existing restorations, pulpal exposure, missing teeth and tooth sensitivity. Different philosophies have been documented for rehabilitation of such cases and the choice of the treatment plan depends on the skill and experience of the clinician. This clinical report describes the full mouth rehabilitation, in functional harmony with the stomatognathic system. Hobo's Twin-stage procedure was adopted to produce a definite amount of disocclusion during eccentric movements using monolithic zirconia.

Keywords: Full mouth rehabilitation, monolithic zirconia, Hobo's technique.

INTRODUCTION

The gradual wear of the occlusal surfaces of teeth is a customary process during the lifetime of a patient. However, excessive occlusal wear can result in pulpal injury, occlusal disharmony, impaired function and esthetic deformity. Tooth wear can be classified as attrition, abrasion and erosion, and leads to an alteration of the vertical dimension of occlusion(VDO).¹ Beyond the traditional options, the use of occlusal onlays and the properties of high strength monolithic zirconia, open the door to less invasive type of tooth preparation thus conserving the tooth structure, therefore reducing the risk of pulpitis.²

This clinical report highlights the use of the Hobo procedure for rehabilitation of a patient with tooth wear, resulting in reduced VDO with monolithic zirconia onlays and crowns. In this procedure, a cast with a removable anterior segment was fabricated

and occlusal morphology of the posterior teeth was reproduced without the anterior segment. This was done to produce a cusp angle coincident with the standard values of the effective cusp angle. Then, reproduction of anterior morphology was done with the anterior segment and providing anterior guidance, which produces a standard amount of disocclusion.

CASE REPORT

A 38 year old male reported to the department of Prosthodontics with a chief complaint of difficulty in chewing food and sensitivity to hot and cold food items. The patient did not give any significant medical history and reported with no signs of temporomandibular joint disorder or myofascial pain dysfunction.

Extraoral examination depicted no facial asymmetry or any muscle tenderness. The mandibular range of

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Fig 1: Facebow record.



Fig 2: Condition I and Condition II waxup.



Fig 3: Maxillary cast surveyed.



Fig 4: Tooth preparation.



Fig 5: Temporization.



Fig 6: Final prosthesis.



Fig 7: Final prosthesis.



Fig 8: Canine guided occlusion.

motion was within normal limits. Intraoral examination established grossly attrited mandibular arch and minimally attrited maxillary arch. The patient had group function occlusion. Approximately 1.5mm of loss in VDO was established. Full mouth reconstruction with the Hobo twin-sage technique was planned to reconstruct the attrited dentition in functional harmony to the stomatognathic system while providing a canine-guided occlusion during eccentric movements. A restoration of 1.5mm of vertical dimension was planned. The amount of

vertical loss and the space available to restore the bite was evaluated. Pre-prosthetic root canal treatment was carried out for the grossly attrited teeth.

Procedure

1. Diagnostic irreversible hydrocolloid impressions were made and evaluated.
2. Facebow transfer was performed to mount the maxillary cast on a semi adjustable articulator. The mandibular cast was mounted with the help of interocclusal records. (fig. 1).
3. An occlusal splint was provided to the patient as a part of reversible interventional modalities to evaluate adaptation of the patient to the restored VDO. The patient was kept in an observational period of 6 weeks before the definitive restorative phase of rehabilitation was started.
4. A diagnostic wax-up of the full mouth restoration was carried at the restored vertical dimension for the posterior teeth without the anterior segment of the maxillary cast in place. (fig. 2).
5. In this technique, occlusal morphology of the posterior teeth is established without the anterior segment. For this, articulator was programmed to condition I of twin stage procedure, where the values of sagittal condylar path and Bennett angle, were set to 25 degrees and 15 degrees respectively. The values of anterior guide table, that is, the sagittal inclination and lateral wing angle were adjusted to 25 and 10 degrees respectively. At this position, the diagnostic wax-up was balanced in protrusive and lateral excursions. The anterior segment of the cast was reassembled, the condylar guidance and incisal guidance were set again (condition II) and the wax-up was completed, so as to generate posterior disocclusion. At condition II, the semi-adjustable articulator was adjusted, with sagittal condylar path and Bennett angle being set at 40 degrees and 15 degrees respectively. The value of anterior guide table was set, with the sagittal inclination and lateral wing angle being set at 45 degrees and 20 degrees respectively.
6. Minimal occlusal reduction is indicated for patients who are scheduled for rehabilitation at the restored VDO. As the maxillary teeth showed only minimal attrition, monolithic zirconia table top onlays were planned for the maxillary posterior teeth and direct composite build-ups/direct laminates for the maxillary anterior teeth. Because the mandibular teeth were grossly attrited, monolithic zirconia full crowns were planned for the same.
7. The maxillary posterior teeth were surveyed to get the height of contours where the margins for the table top onlays were planned. (fig. 3).
8. The tooth preparation for the maxillary posteriors and mandibular arch was carried out. (fig.4)
9. Composite build-up was carried out for the maxillary central incisors and the canines using putty indices of the wax up as reference.
10. Provisional restorations were made with heat polymerizing acrylic resin which was derived from the wax-up template from above mentioned procedure. Provisional crowns were then cemented with zinc oxide non-eugenol. 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 restored by 1.5mm. (fig. 5)
11. Once the patient was satisfied with temporary restorations, the definitive cast was fabricated from the final impressions made with poly vinyl siloxane. The final prostheses were fabricated on the definitive cast by using the same values that were used to fabricate temporary prosthesis. (fig. 6)
12. The monolithic zirconia copings and onlays were cemented with resin modified GIC. (fuji CEM) and canine guided occlusion was achieved. (figs. 7 and 8).

13. On frequent recalls, patient gave satisfactory reviews with the treatment which was provided.

DISCUSSION

Occlusal rehabilitation deals with the restoration of functional integrity of dental arches by the use of inlays, crowns, FPDs and partial dentures. The primary objective of full mouth rehabilitation is preservation of health, restoring function and achieving aesthetics and patient comfort. A systematized and integrated approach is required for a prognosis that is favourable and predictable.³

As was stated by D Amico, cuspid protected occlusions and disocclusions were natural adaptations which were used for preventing destructive occlusions. Added to the aesthetics and comfort, the other important factor which has to be taken into consideration is disocclusion of teeth during excursions which would preserve the integrity of entire stomatognathic system, thus resulting in a long lasting, functional restoration.

The etiology of tooth wear is multifactorial. In addition, lack of evidence regarding the long-term outcomes of treatment methods and materials cause difficulty in clinical decision-making. Because of these unclear guidelines, incline towards adhesive dentistry that is more conservative and reversible, is increasing. Onlays instead of crowns were planned for minimally attrited maxillary posterior teeth instead of full crowns, thus making the approach more conservative.³

Monolithic zirconia was the material selected for the patient's treatment to ensure adequate strength.⁴ The primary advantage of a zirconia restoration is esthetic benefit as it is tooth-coloured.

As per literature, condylar guidance and anterior guidance are considered as primary determinants of occlusal rehabilitations. The technique which was used in this case for occlusal rehabilitation of a severely worn dentition (HOB technique), describes the method of reorganizing an occlusion by using cuspal angle as the primary determinant.^{5,6}

In prosthodontics, the condylar path of the patient is used as the main occlusal determinant. However, research has found that the condylar paths have

deviations and that they exert minor influence on disocclusion. This deviation is greatly influenced by anterior guidance.⁷

Mutually protected occlusion has now established its role as an important factor for maintaining the harmonious functioning of the masticatory system. The principle behind it being that the anterior teeth which are away from the fulcrum line will transmit less force to the supporting tissues when the mandible is in eccentric position. Also, the temporomandibular joint will withstand the forces of mastication adequately when the condyle disk assembly is in centric relation position. Since the joint loses its musculoskeletally stable position during excursion, axial loading of the joint is not possible which necessitates that the forces acting on it be reduced. The canines and anterior teeth thus function as natural stress breakers leading to disocclusion of the posteriors.

Condylar path has always been regarded as a key determinant of occlusion. However, according to the work by Hobo and Takayama^{8,9}, condylar path has shown to have deviation and exerts a minor influence on disocclusion. According to the mathematical calculations done, when the sagittal inclination of the incisal guidance was increased by 1°, the amount of disocclusion on protrusion, nonworking and working side was increased by 0.038, 0.042 and 0.039 mm respectively. Similarly, every degree rise in cusp angle the amount of disocclusion was increased by 0.046 mm on protrusion, 0.046 on nonworking side and 0.041 mm on the working side. However, it was found that every degree rise in the horizontal condylar guidance, the amount of disocclusion is increased by only 0.020 mm during protrusion, 0.015 mm on nonworking side and -0.002 mm on the working side.

Thus, the cusp angle and the anterior guidance are more important determinants to achieve disocclusion and use of an average angulation of the horizontal condylar guidance can be successfully used to achieve a mutually protected occlusion.

CONCLUSION

An important aspect of restoring worn out teeth is the protection of remaining tooth structure. Teeth already weakened by loss of large amount of tooth

structure are ill-equipped to withstand occlusal forces.¹⁰ Protection can be best provided by restoring them with the restorations (onlays/crowns) which further restrict their wear and tear. The principles and concepts involved in oral rehabilitation using Hobo procedure were discussed in this article. The amount of disocclusion of teeth is significantly controlled by the condylar and incisal guidance and disregards the role of measured condylar guidance. The average calibrations of condylar, lateral and incisal guidance and cusp angle provide an easy approach of management with lesser skills needed.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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