

A Twin Stage Occlusal Concept by Hobo for Rehabilitation of Severely Attrited Teeth: An Esthetic and Functional Need

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ABSTRACT

Background: Attrition is the loss of tooth structure caused by tooth-to-tooth contact during occlusion and mastication. Excessive occlusal wear can result in occlusal disharmony, pulpal injury, impaired function and esthetic deformity. Severe wear of anterior and posterior teeth results in loss of anterior guidance which protects the posterior teeth during excursive movement. Resotation of occlusion in patients with severely attrited dentition is a challenging task. There is great apprehension involved in reconstructing debilitated dentition due to widely divergent views concerning the choice of an appropriate occlusal scheme for successful full mouth reconstruction. This clinical report describes the use of Hobo Twin-stage procedure for rehabilitation of patient with generalized attrition.

Keywords: Tooth wear, vertical dimension and centric relation, lucia jig, anterior guidance.

INTRODUCTION

Restoration of severely worn out dentition is one of the most challenging procedure. One of the most demanding aspects of such cases involves the development of sufficient restorative space, and fulfilling esthetic, functional, and occlusal needs for long term success.

The term “attrition” comes from the Latin verb attritum, which refers to the action of rubbing against another surface. Some degree of attrition is physiologic, and the process becomes more noticeable with age. When the amount of tooth loss is extensive and begins to affect aesthetic appearance and function, the process must be considered pathologic.¹⁵

ETIOLOGY FOR PATHOLOGIC ATTRITION¹⁶:

- Development- malocclusion and crowding of teeth, may lead to traumatic contact during chewing, which may lead to more tooth wear.
- Acquired- due to extraction of teeth. Extraction causes increased occlusal load on the remaining teeth, as the chewing force for the individual remains constant.
- Abnormal chewing habits- parafunctional chewing habits like bruxism and chronic persistent chewing of coarse and abrasive food or other substances like tobacco.
- Occupation- in certain occupations, workers are exposed to an atmosphere of abrasive dust and can not avoid it getting into mouth.

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- Salivary factor- can also play role in attrition.
- Structural defect- like amelogenesis imperfect and dentinogenesis imperfect, hardness of enamel and dentin is reduced and such teeth become more prone to attrition.

Excessive tooth wear can results in reduced VDO (vertical dimension of occlusion). Furthermore reduced VDO results in

-the patient will look older as the lower half of the face is compressed,

-the cheeks and lips are slack,

-and the chin protrudes.

This clinical report highlights the use of Hobo twin-stage procedure for rehabilitation of a patient with severe tooth wear, resulting in reduced VDO. In this procedure, a cast with a removable anterior segment was fabricated and occlusal morphology of posterior teeth was reproduced without anterior segment. This was done to produce a cusp angle coincident with the standard values of effective cusp angle (**Condition 1**). Then reproduction of anterior morphology was done with the anterior segment and providing anterior guidance which produces a standard amount of disocclusion. (**Condition 2**). (Table 1)

CASE REPORT

A 48 year old female reported to dept. of prosthodontics AMC dental college and hospital with chief complain of difficulty in chewing food and sensitivity to hot and cold food items and esthetically unpleasant as well. On examination the patient gave no significant medical history and did not report any signs of temporomandibular joint disorder or myofascial pain dysfunction.

Extraoral examination depicted no facial asymmetry, or muscle tenderness. The mandibular range of motion was within normal limits. Intraoral examination established grossly attrited dentition in both maxillary and mandibular arches. The patient had a bilateral class I molar relation in a canine-guided occlusion. Approximately 3-4mm of loss in vertical dimension of occlusion was established. Full mouth rehabilitation with Hobo twin-stage technique was planned to reconstruct



Fig 1: Pre-operative view.



Fig 2: surgical phase- marking the gingiva to be removed for crown lengthening procedure.



Fig 3: Few days after crown lengthening procedure- sufficient height achieved for restoration.



Fig 4: Wax up trial.



Fig 5: Mounting on semi adjustable articulator.



Fig 6: Canine guided occlusion.



Fig 7: Post-operative view.

the attrited dentition in functional harmony to the stomatognathic system while providing a canine-guided disocclusion during eccentric movements. An increase of 4 mm of vertical dimension was planned. The amount of bite rise to be achieved was also evaluated using the 'Closest S-speaking space' or 'Freeway Space' technique.

PROCEDURE:

- Consent was taken from the patient before the start of treatment. Impressions of both arches were made with irreversible hydrocolloid material. (Tropicalgin, Zhermack, Italy). And diagnostic casts were obtained.
- Endodontic treatment: those teeth having nearby pulpal exposures root canal treatment (RCT) were carried out as needed.
- Periodontal treatment: generalized attrition was so severe that surgical crown lengthening procedure was also done to achieve more clinical crown length.
- The maxillary cast was mounted on a semi-adjustable articulator with a facebow transfer and mandibular cast was mounted with a Lucia Jig in the anterior region and interocclusal records. (Bitrex, Equinox, Netherlands) in the posterior region.
- An occlusal splint (Heat-cured acrylic resin, DPI, Mumbai) was provided to the patient as part of reversible interventional modalities to evaluate adaptation of the patient to the altered VDO. The patient was kept in diagnostic and observational period of 6 weeks before the definitive restorative phase of rehabilitation was started.
- A diagnostic wax-up of the full mouth restoration was carried out at the increased vertical dimension for posterior teeth without the anterior segment of maxillary cast in place. To produce standard effective cusp angles, the condylar and the incisal guidance were set to condition 1. At this position the diagnostic wax-up was balanced in protrusive excursion and lateral excursions. The anterior segment of the cast was reassembled and the condylar guidance and incisal guidance were set again (condition 2) and the wax-up was completed so as to generate posterior disocclusion.
- All teeth were prepared for full coverage metal-ceramic restorations. Stage I temporary restorations (DPI dental products, Mumbai) were fabricated chairside quadrant by quadrant during several appointments to minimize patient discomfort. The patient's vertical dimension of occlusion was maintained by using unprepared second molar teeth as occlusal vertical stops, which will be prepared later. Minimal occlusal reduction is indicated for patients scheduled for rehabilitation at an altered vertical dimension of occlusion.

- Then the second molars were prepared and stage II temporaries (DPI dental products, Mumbai) were fabricated using the index of the diagnostic wax up and cemented with ZnO non eugenol cement. (Freegenol, GC, India) and left for 3 weeks.
- Once the patient was adapted to this position, a final full arch impression for maxillary and mandibular teeth was made by using poly (vinyl siloxane) impression material (Reprosil, Dentsply, USA) and casts were poured in type IV gypsum (Kalabhai karson, Mumbai). This cast was mounted on semi-adjustable articulator using the face-bow transfer.
- To transfer the vertical dimension and centric relation temporaries were removed from both maxillary and mandibular left posterior region while the temporaries of right and anterior maxillary and mandibular region acted as a stop. Interocclusal recording material was injected between the left maxillary and mandibular prepared tooth. Likewise, the temporaries were removed from right maxillary and mandibular region while the temporaries were present in left, an anterior region of both arches, interocclusal record was injected between the right maxillary and mandibular prepared tooth, the same procedure was followed in anterior region. The three segmental interocclusal records thus obtained were used to mount the mandibular cast.
- The wax pattern was fabricated with the anterior mandibular segment removable following condition 1 and 2. All the wax patterns were cast, and metal copings (KeraN, Germany) were tried in patients mouth. Definite restorations with PFM (porcelain fused to metal) crowns, exhibiting a vital and natural appearance with proper contour and shade were fabricated.
- Permanent cementation were done with GIC luting cement (Ketac Cem, 3MESPE, Germany). Oral hygiene instructions emphasizing use of dental floss and proper brushing were given and follow-up was carried out at an interval of 6 weeks.

DISCUSSION

Full mouth rehabilitation is a treatment modality which not only focuses on the esthetics and functional aspect of the dentition but also improves upon the health of the whole stomatognathic system.¹

Full mouth rehabilitation involves the procedures necessary to produce healthy, esthetic, well functioning masticatory system.¹⁰ The three prime requirements are healthy TMJ, harmonious anterior guidance and noninterfering posteriors.¹³ These 3 factors are interrelated and any disharmony between these will affect the stomatognathic system.

The diagnostic wax-up should always precede the treatment so as to decide on the appearance, to remove occlusal interferences and act as a predictor to the amount of tooth preparation that is required. Diagnostic wax-up is done to establish the desired esthetics, tooth contour, position of tooth, and occlusal plane. It also helps in fabrication of provisional restoration less time consuming.

The anterior teeth are usually restored first so as to achieve functional and esthetically viable anterior guidance. Anterior guidance plays a very important role in full mouth rehabilitation following centric relation.^{3, 13} The anterior guidance forms the anterior control to provide posterior disclusion. The job of anterior guidance is to protect the posterior teeth from lateral or protrusive stresses. The facebow transfer is must to relate the anterior guidance with the opening and closing axis. It is required to reproduce the arc of closure from patient to the articulator.

The three main things to be taken into consideration while replacing posterior teeth, are achieving posterior disclusion, establishing the plane of occlusion and deciding type of occlusal scheme. Disclusion refers to separation of the opposing teeth during eccentric movements of mandible, as reported by Christensen, D'Amico.¹⁴

Posterior occlusion should have equal simultaneous contacts so that it does not interfere with either TMJ in the back or the anterior guidance in front. Deflective occlusal interferences should be removed. A proper plane of occlusion must permit disclusion of

Table 1: Articulator adjustment values for hobo twin-stage procedure (degree).

Condition	Condylar path		Anterior guide table	
	Sagittal condylar path inclination	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

all teeth on the balancing side when mandible is moved laterally. The reconstruction of vertical dimension of occlusion should be done at the centric level and it should be acceptable for the patient at the neuromuscular level.¹²

Turner in 1984 classified the treatment of a severely worn dentition by the amount of loss of VDO and available space to restore. His classification and conventional treatment, which includes raising VDO with multiple crown lengthening procedure, have been widely used up to present.

According to Pankeymann-Schuyler theory anterior guidance is first established followed by restoration of posterior teeth.

Previously, the condylar path was the principle focus of attention for gnathologists, since it did not change during adulthood and the determination of anterior guidance remained the sole discretion of the dentist. Thus, anterior guidance and the condylar path were considered independent factors.

According to Dawson, condylar path was not a determination of anterior guidance, and if did not matter whether the anterior path was flat, curved, concave, convex or parabolic, the rotating condyle sliding down the unchanged condylar path permits the lower anterior teeth to follow any number of path variations without interferences.⁴

According to investigation, on molar disocclusion during eccentric movements, the amounts of disocclusion were 1.1 ± 0.6 mm during protrusive movements 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.³ 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 nonworking side differs 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 the disocclusion. The residual amounts can also be attributed to the cusp shape factor.⁹

The amount of the cusps also contributes to posterior disocclusion. The posterior teeth disocclude only when the cusp inclination of molar is parallel to the condylar path and anterior guidance is steeper than the condylar path. If the shapes of the posterior cusps are less steep than the condylar path, the posterior teeth disocclude even if anterior guidance is parallel to the condylar path.

The contraindications of Hobo twin-stage procedures are¹¹:

- Abnormal curve of Wilson
- Abnormal curve of spee
- Abnormally tilted teeth
- Abnormally rotated teeth.

CONCLUSION

Hobo twin-stage procedure has been discussed for rehabilitation of severely attrited teeth. The amount of disclusion of teeth is significantly controlled by condylar and incisal guidance. Full mouth rehabilitation is a treatment modality which not only focuses on the esthetics and functional aspect of the dentition but also improves upon the health of the stomatognathic system. A definitive diagnosis and treatment planning is necessary to achieve predictable success.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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