



Rehabilitation of Lost Vertical Dimension With Zirconia, Using Modified Hobo Twin- Stage Technique A Case Report

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ABSTRACT

Numbers of cases are reported with worn out dentition irrespective of the age of a person. In the majority of the cases, they are associated with bruxism and clenching which is linked with stress. Worn-out dentition affects general health, facial appearance, phonetics and masticatory efficiency. Vertical dimension in the attired dentition is a vital parameter. Majority of the cases are rehabilitated with porcelain fused to a metal which compromises esthetics. Zirconia is a new material and it has better gingival response and esthetics. This paper describes the full mouth rehabilitation of 38 yrs. old female reported to the Department of Prosthodontics with severely attrited dentition along with loss of vertical dimension. Heat-cure acrylic temporaries were fabricated using diagnostic wax-up and were cemented on the attrited teeth without any tooth reduction. After 4-8 weeks, clinical assessments were done for muscles and joints, followed by definitive restoration. For anterior segments layered zirconia was used and for posterior segments, monolithic zirconia was the choice of material. The definitive prosthesis was made of Zirconia which gives better esthetics and good gingival response. Hobo twin-stage technique was used for complete rehabilitation with a modification based on the fact that fixed prosthesis gives a better assessment of muscles than a removable splint.

Keywords - Generalized Attrition, Bruxism, Vertical Loss, Modified Hobo Twin-Stage Technique.

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INTRODUCTION

Teeth are important for human life, without them survival is challenging. Loss of teeth due to any reason leads to poor general health. Numbers of cases are reported with worn out dentition irrespective of the age of a person. Bruxism and clenching (Para-functional activities) are major etiological factors, responsible for generalized attrition which is associated with stress. Generalized attrition (GA) affects phonetics, masticatory efficiency and facial esthetics. GA can occur with or without loss of the vertical dimension. Teeth work in harmony with muscles and joints. Alteration in teeth can affect muscles and joints (TMJ) so correct assessment of muscles is important [1]. In the conventional technique, removal splint is used for 4-8 weeks (Hobo Twin-Stage technique for Full Mouth rehabilitation) to assess the effect of vertical raise on the musculature. But, in this case, heat cure acrylic temporaries were used based on the fact that fixed prosthesis gives a better assessment than removal splint. They were cemented (temporary cement) on attired teeth without any teeth reduction for 2 months. Final prosthesis was made of zirconia as it has comparable strength as porcelain and has a better gingival response. Esthetics is much better with zirconia as compared to porcelain [2, 3]

CASE REPORT

A 38yrs old female reported to the Department of Prosthodontics, SGT University, Haryana with the chief complaint of inability to chew the food, sensitivity to hot and cold in the front upper and lower teeth region and compressed lower half face. On examination, she had no relevant medical history. She had no sign of temporomandibular disorder or myofascial pain dysfunction. All mandibular movements were within range and there was no facial asymmetry. The assessment of vertical dimension was done by Phonetics and Niswonger's method (Figure 1).



Figure 1 (A): - Vertical Dimension of Occlusion (VDO) before Treatment, (B) VDO after Treatment

The vertical dimension of occlusion was 56 mm and the vertical dimension of rest was 62 mm. On Intraoral Examinations, no gross abnormality was noted on overall soft tissues. Both the arches i.e. maxillary and mandibular were fully dentate. Open occlusal contacts were present in anterior maxillary and mandibular teeth with moderate to severe generalized attrition, severe on the lingual surface of maxillary anterior and moderate on lower anterior and posterior teeth and open orifices of maxillary and mandibular anterior teeth (Figure 2- 3)



Figure 2(A):- Pre-Operative Intra- Frontal View (B) Left Lateral (C):- Right Lateral View



Figure 3 (A):- Occlusal View of Maxillary Arch, (B):- Occlusal View of Mandibular Arch

On radiographic evaluation: - Loss of enamel and dentine were present with respect to anterior teeth of the maxillary and mandibular arch with no prominent periapical pathology (Figure 4).



Figure 4:- Pre-Operative Radiographic View

Treatment

Root canal treatment was done with respect to 11,12,13,14,21,22,23,24,31,32,33,41,42 and 43. Diagnostic impressions were made using alginate (irreversible hydrocolloid – Septodont, class A dust-free, normal setting Type 2) impression material (Figure 5A) and casts were poured using type 3 dental stone (Gypstone, type 3- super hard dental stone). After die cutting the entire cast was divided into three segments One anterior and two posteriors (For both maxillary and mandibular, Figure 5 B).

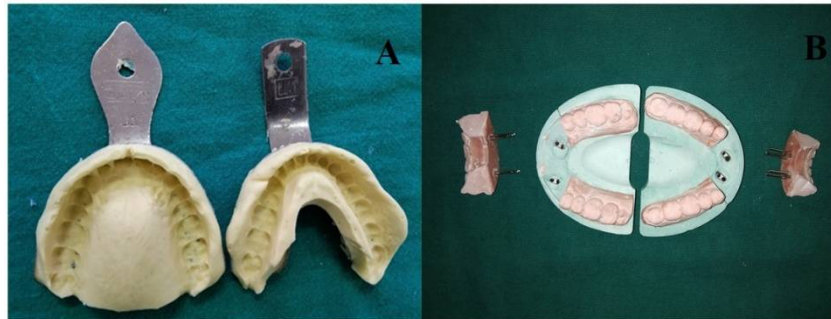


Figure 5(A):- Diagnostic Impressions (B):- Sectioned Cast

The maxillary cast was articulated on a semi-adjustable articulator (bio-art) using face-bow records and then the mandibular cast was articulated with the help of Lucia-jig and inter-occlusal records in centric relation position (Reorganized Approach, **Figure 6**).



Figure 6(A):- Face-Bow Record, (B):- Diagnostic Mounting with Lucia Jig in Centric Relation

Vertical height was raised 3 mm followed by Diagnostic Mock-up, which was done according to the Hobo twin-stage technique (**Figure 7**).



Figure 7:- Diagnostic Mounting with Mock-Up

First, the occlusal plane was set with central incisor wax-up then wax-up for the posterior segment (After programming of articulator according to condition 1, **Table 1**) was done followed by anterior segment (After reprogramming of articulator to condition 2, **Table 1**).

Table 1: Articulator Adjustments 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°

Interferences were removed both in centric and eccentric movements. Heat cure acrylic provisional were made by curing of diagnostic wax-up and then these provisional were cemented on teeth without any teeth reduction with temporary luting cement (NETC) and confirmed for canine guided occlusion and protrusive disocclusion). After 8 weeks we had checked for TMJ and muscles activity. No abnormal symptoms were found. (Figure 8)

**Figure 8(A):- Temporization respect to Posteriors, (B):- Complete Temporization Done**

Definitive Prosthesis: - Segmental rehabilitation was done. First, for the anterior segment, Provisional was removed, tooth preparation was done with minimal occlusal teeth reduction and final impressions were made with addition silicone (Figure 9).

**Figure 9:- Final Impressions in Addition Silicon for Anterior Segments**

Bite registration was done using bite registration paste and during bite registration, the provisional restorations of posterior segments were left in place. Cementation of provisional restorations with their chair side relining (Protemp 4, 3M ESPE) was done. Impression was poured in die stone and Cast was articulated on an articulator (Bio-Art) with die-cutting. Zirconia coping were made using CAD-CAM technique and then layering was done with dental porcelain. The bisque trial was done to check for any occlusal interference in centric and eccentric movements followed by final cementation using dual-cure resin as the luting agent. After completion of anterior segments, the same procedure was repeated for the posterior segments. Monolithic zirconia was used for posterior segments (Figure 10). The occlusal scheme was checked in various excursive movements before complete cementation i.e. mutually protected occlusion with canine guided occlusion (Figure 11). All oral hygiene instructions were given

with emphasis on brushing habits and flossing. Follow up was done at 1 month, 3 months, 6 months and 1-year postoperatively (Figure 12, 13).



Figure 10(A):- Anterior Layered Zirconia (B):- Posteriors Monolithic Zirconia

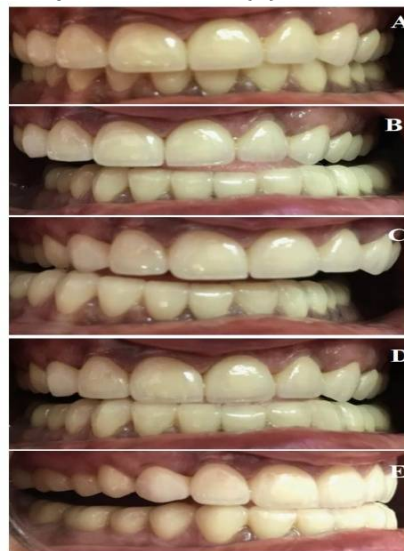


Figure 11:- Final Prosthesis in Various Excursive Movements

(A):- In Centric Occlusion, (B):- Canine Guided Occlusion on Left Side, (C):- Canine Guided Occlusion on Right Side, (D):- Protrusive Movement, (E):- Posterior Disocclusion on Protrusive Movement

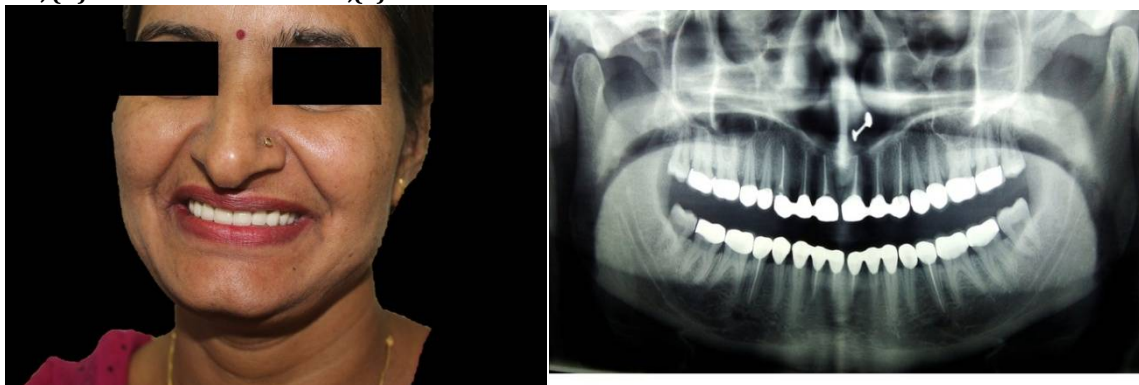


Figure 12:- Post-Operative Figure 13:- Post-Operative Radiographic view

DISCUSSION

Attrited dentition is often associated with muscles and joint pain. Also, it is associated with altered speech and esthetics. Restoration of teeth can reverse this condition. The assessment of muscular and joint response to raise vertical height and assessment of correct occlusal plane during its provisional phase can help us to form a better final prosthesis. Full mouth rehabilitation can be done using several techniques³. Hobo twin-stage philosophy is the most accepted and widely used [4]. It involves the reconstruction of

dentition in mutually protected-canine guided occlusion by using semi-adjustable articulator. It can be used in both cases, with vertical loss or without vertical loss. In Hobo tech. a removable splint is used for 2 months to assess muscles response on raise vertical height. In this modified Hobo twin-stage technique, fixed provisional made up of heat cure resin were cemented for 4-8 weeks, to assess the effect of raise vertical on muscle and joint based on the fact that fixed prosthesis gives better assessment than a removable splint.

With Hobo twin-stage technique we can simultaneously rehabilitate maxillary and mandibular arch (single-stage) but the disadvantage of that is patient discomfort, complete arch anesthesia, loss of vertical raise and extended appointments with multiple inter-occlusal records [5]. The segmental approach of rehabilitation (completion of one segment before the beginning of another) required segmental anesthesia, which gives predictable appointment or time, beneficial for the patient as well as for the dentist. It maintains a vertical raise during the complete procedure. The disadvantage of doing a segmental approach is an unpredictable occlusal scheme and occlusal plane.

Esthetics plays a very important role in rehabilitation. Layered zirconia is much vital and gives good esthetics as compared to porcelain fused to metal restorations. The disadvantages of using zirconia are its high cost and delamination of the porcelain layer from zirconia copings.

Initial philosophies of occlusion are based on the concept that condylar guidance and incisal guidance are two independent factors i.e. condylar path will move in straight direction irrespective of incisal guidance [6, 7] According to Hobo twin-stage technique, they are dependent factors[8], he had given average values for condylar guidance angle and incisal guidance angle [9]. A difference of at least 5 degrees is reported between condylar angle and incisal guidance angle in natural dentition to achieve posterior disocclusion although it is not the only factor responsible. This difference is also followed by Hobo twin-stage technique.

Cusp angle also has an important role in creating posterior disocclusion. This is mandatory to create mutually protected occlusion to protect the teeth from harmful lateral forces [10]. It is reported that in healthy adult dentition the amount of disocclusion is around 1.1 ± 0.6 mm (non-working side), 0.5 ± 0.3 (working side) on lateral movements and is recorded at the mesio-buccal cusp tip of 1st molar. On protrusive movements, it is around 1.1 ± 0.6 mm. the amount of disocclusion on the working side is equal to the amount of disocclusion created by the angle of hinge rotation and it is different from disocclusion created by protrusive and non-working side disocclusion[11]. It suggests that the cusp angle and anatomy also have an important role. If we shape our posterior teeth cusp shallower than the condylar path, disocclusion will occur even when condylar and incisal angles are the same [12-13]. VD loss can be confirmed using a variety of methods, including phonetics, aesthetics, and interocclusal distance[14-15].

CONCLUSION

Esthetics plays an important role in today's scenario. Porcelain fused to metal is although a cost-effective treatment modality but do not provide good esthetic results. Zirconia has comparable strength and good gingival response along with esthetics so can be used in anterior as well as in posterior segments. Provisional restorations are used to access muscles and joint response to raised verticals. Fixed provisional can provide a better assessment as compared to the removable prosthesis.

CONFLICT OF INTEREST

The authors deny any conflict of interests.

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