



Multidisciplinary Approach in Severely Attrited Dentition – A Case Report

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ABSTRACT

The aim of this study was to describe the treatment used in an elderly patient presenting with bruxism and severe attrition, with good gingival health and bone support, without loss of occlusal vertical dimension. Full mouth rehabilitation is a challenging treatment modality that enhances the appearance of the patient and corrects imperfections in the occlusion. The evaluation and establishment of the occlusal vertical dimension (OVD) is considered particularly important. Before placement of fixed restorations to increase the VDO, a removable splint, and then provisional restorations must be tried to check the suitability of the increase in OVD.

Key Words: Bruxism, Vertical dimension, Occlusion, Aesthetics

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INTRODUCTION

Wear is deterioration as a result of use. Tooth wear has existed since the beginning of humanity and in all civilizations. It occurred systematically and intensively in past populations, but is considered a physiological process. However, this notion is often unclear as nowadays, although the process is less well developed, it is sometimes pathological in nature.¹

Most dentists agree that minimal and gradual attrition of the occlusal surfaces of teeth is a normal process during the lifetime of a patient. However, excessive occlusal attrition can result in pulpal pathology, occlusal disharmony, impaired function and esthetic disfigurement. Patients with excessive wear often require extensive restorative treatment.² Esthetic dentistry has created a revolution in dental materials and technology. Our health and beauty-conscious society, with the largest discretionary income in history, has created an ever-increasing demand for esthetic dental procedures. Many patients seek esthetic dental care because of worn dentitions.

The goal of dentistry is to increase the life span of the functioning dentition, just as the goal of medicine is to increase the life span of the functioning individual.³ The longevity of the prosthesis and occlusal stability can be achieved by providing the good esthetics and the correct anterior guidance.

The existing vertical dimension of occlusion (VDO) has to be assessed intraorally and extraorally before considering increasing the VDO. Sometimes the vertical dimension has to be restored or increased. The contributing factors for excessive wear of teeth are evaluated and should be removed or reduced if possible.⁴ These assessments reveal the merits of changing the VDO and permit the clinician to evaluate suitable treatment options.⁵ It is critical to verify loss of VDO before the restoration of an increased VDO. The different techniques that can be used are: use of phonetics, the use of interocclusal distance and the evaluation of soft tissue contours.

In many situations, the VDO is maintained by means of some compensatory mechanisms (continuous tooth eruption and alveolar bone

growth). To determine whether VDO has been altered, the following aspects should be observed:

- 1. Loss of posterior support:** Posterior collapse places undue stress on the anterior segment that eventually becomes mobile or wears excessively, resulting in loss of VDO.
- 2. History of wear:** When occlusal wear is gradual, it is generally compensated by continuous tooth eruption. The rate of eruption may be exceeded by accelerated wear, for example, in congenital anomalies, excessive oral habits (bruxism) or acidic erosion.
- 3. Phonetic evaluation:** Normal mandibular position during the /S/ sound places the incisal edge of the mandibular incisors about 1 mm inferior and lingual to the incisal edge of the maxillary incisors. Vertical positioning significantly more than 1 mm apart may indicate loss of VDO.
- 4. Interocclusal distance:** Measurements of the distance between 2 points, one marked on the patient's nose and another on the chin, made in centric occlusion and with the mandible in the rest position, determine VDO and vertical dimension of rest position (VDR) respectively. When these measurements are compared and the difference is larger than 2 to 4 mm, it can be considered that VDO has decreased.
- 5. Facial appearance:** Diminished facial contour, commissures of the mouth turned down, thin lips, loss of muscle tone with the face appearing flabby instead of firm and the presence of angular cheilitis are typical facial aspects associated with overclosure. When there is no need to increase the VDO, the worn teeth may be restored by means of a periodontal surgery, to gain clinical crown length, orthodontic movement with limited intrusion and surgical repositioning of a segment of teeth and supporting alveolus.⁶

Use of more than one technique of evaluation of VDO may increase the accuracy and reliability of the final treatment. This article discusses a conservative approach in a severely worn dentition by restoring esthetics and function.

CASE REPORT

A 56-year male patient presented with chief complaint of generalized attrition (Fig.1A) and wanted to improve his dental appearance. He gave history of clenching of teeth in the night, he was aware of his bruxing habit, which was the chief cause of the occlusal wear.

The baseline data were collected from: (1) clinical examination and photographs. This included examination of the temporomandibular joints and the VDR and VDO; (2) articulated study casts; and (3) radiographs. This comprised a dental panoramic radiograph and periapical radiographs of the teeth to be restored. Clinical examination revealed generalized abrasion in both the archs but in the anterior maxillary and mandibular region there was severe abrasion. The patient presented end-to-end bite at maximum intercuspation. Centric relation was not coinciding with maximum intercuspation.

The patient characteristically came under category III of the Turner and Missirlian classification of patients with severe loss of teeth, where patients present following features²:-

1. Excessive wear of anterior teeth
2. Vertical dimension not change
3. Chubby face appearance

It was planned to restore the entire dentition with porcelain fuse to metal crown by increasing the vertical dimension of occlusion by 2mm. Maxillary and mandibular impressions were made using irreversible hydrocolloid (Neocolloid, Zhermack, Badia Polesine, Italy) and diagnostic casts were obtained. Maxillary cast was mounted using Hanau ear piece face bow on a Hanau articulator. Face-bow transfer were taken and mounted on the semiadjustable hanau wide view articulator with the jaw relation record. Diagnostic wax-up (Fig.1B) were done for reconstructive modifications of the cast or design of the final future prosthesis.

Treatment Procedure:

After ruling out an abrasive diet, erosive components and day and night bruxism, initial treatment consisted of oral hygiene instructions, scaling and root planning. Endodontic therapy was carried w.r.t 11,12,13,14,21,22,23,24 and 1,32,33,34,35,36,41,42,43,44,45,46. Crown lengthening was done in the maxillary and

mandibular anterior teeth from canine to canine (Fig.1C).

The use of crown lengthening surgery (CLS) is an excellent way to improve the contour of gingival tissues and enhance the esthetic display for patients with a high or average lip line when

smiling. If the clinical crown height is less than 3 mm, CLS is the only way to provide adequate preparation height by exposing more tooth structure. A combination of VDO and CLS may also be useful.⁵



Figure 1: (A) Generalized occlusal attrition in a 56-year male patient, (B) Diagnostic wax-up, (C) Crown lengthening procedures were carried out on 13,12,11,21,22,23,33,32,31,41,42,43 (D) Occlusal splint constructed using self-cured clear acrylic

After careful examination of the vertical height, centric relation and occlusion, an occlusal splint (Fig.1D) was constructed. In brief, the occlusal plane was recorded using a face-bow transfer and both the casts were mounted on a semi-adjustable articulator (Hanau wide view) in centric occlusion. The vertical pin of articulator was raised by 3mm. The splint was constructed using self-cured clear acrylic, which flows into the embracers and interdental spaces giving the retention of the splint. Protrusive and lateral movements of the articulator were done and all the hindrances in protrusive and lateral movements were removed and then the splint was delivered to the patient.

The patient was observed periodically for six to eight weeks while appropriate adjustments were made if required. At the same time, the patient was evaluated for comfort and function at that increased dimension. As the patient adapts to the restored vertical dimension, tension or pain in the temporomandibular joint and the muscles decreases.⁷

Smile design principles including “golden proportion” and facial esthetic analysis were employed. Anterior discussion in lateral and protrusive excursions were important considerations in the occlusal scheme of the wax-up.⁸ These modifications can be the blueprint for planned occlusion and the fabrication of provisional restorations.

Custom made post and cores were done in the maxillary anterior teeth (Fig 2A and 2B), prefabricated serrated metal posts were used in the mandibular anterior and posterior region (Fig 2C). Maxillary and mandibular teeth were modified on the diagnostic models to restore the optimum morphology, esthetics and function. Efforts weremade to keep the anterior guidance no

steeper, end generally shallower, than that with which the patient originally presented. Mandibular posterior teeth were modified on the mounted diagnostic casts to establish plane of occlusion with the optimum curves of Spee and Wilson using a Broadrick Occlusal Plane Analyzer (Fig 2D) or "Broadrick Fiag".

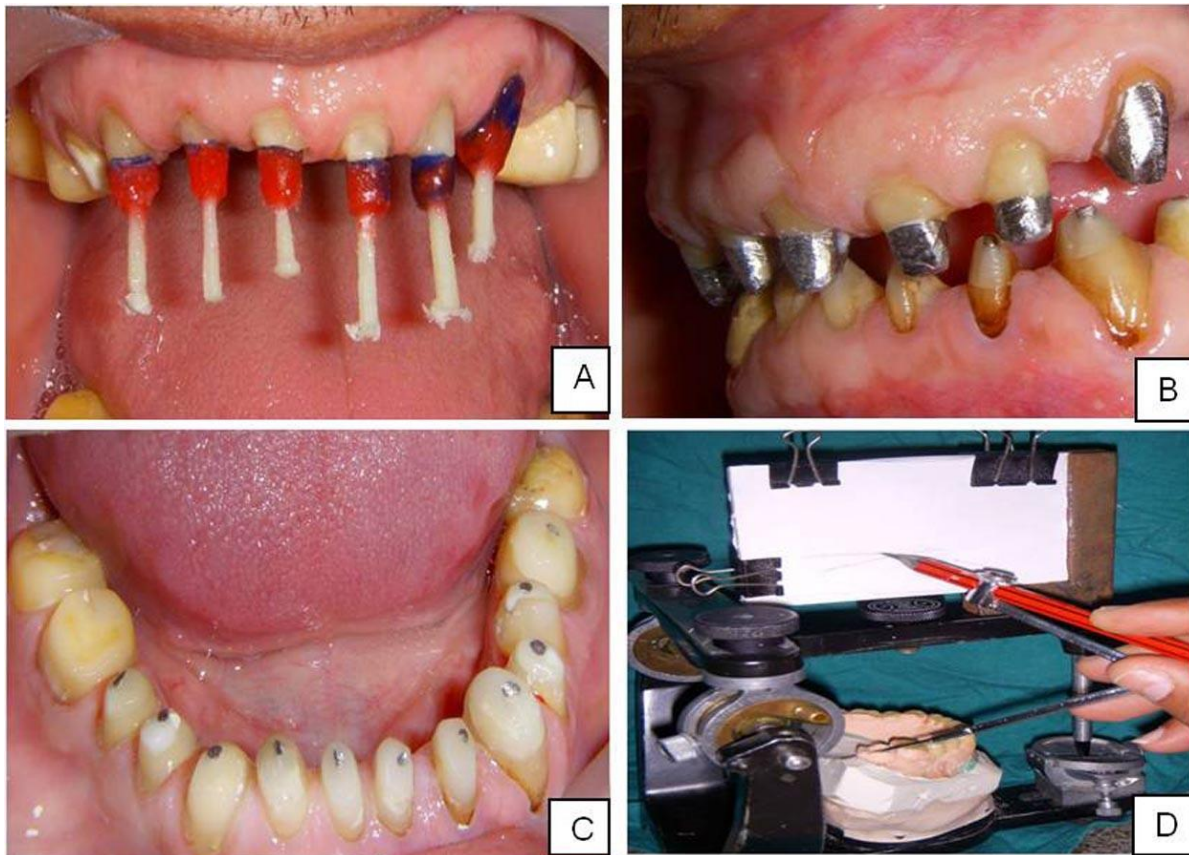


Figure 2: (A) Custom made post and core build with pattern resin, (B) Custom made post and core cementation, (C) Prefabricated serrated metal post with composite build-up, (D) Broadrick Occlusal Plane Analyzer

Tooth Preparation

Tooth preparation, including margin location, parallelism and clearance for porcelain was refined after the initial cementation of the treatment restorations. Additions to the interim restorations are required when major changes are made in tooth preparations. The incisal guide table is set from the anterior guidance of the facsimile mountings while condylar settings remain from the initial mounting.⁹

After all tooth preparations for full coverage metal ceramic crowns were completed, a final full-arch impression for maxillary and

mandibular teeth was made using polyvinyl siloxane (Aquasil, Dentsply, Germany) impression material with double-mix single impression technique and casts were poured in die stone (Kalrock; Kalabhai Pvt. Ltd., Mumbai, India) which was later secured to a die pins with base.

Provisionalization

Tooth preparation and provisionalization are generally carried out in two stages, with the maxillary and mandibular arches prepared separately on successive days. Acrylic provisional restorations were cemented with temporary

cement that was eugenol free. Patient was allowed to wear these provisional restorations for an appropriate amount of time. Provisional

restorations refine and confirm functionally of the occlusal design previously developed from the treatment-planning diagnostic waxup.¹⁰

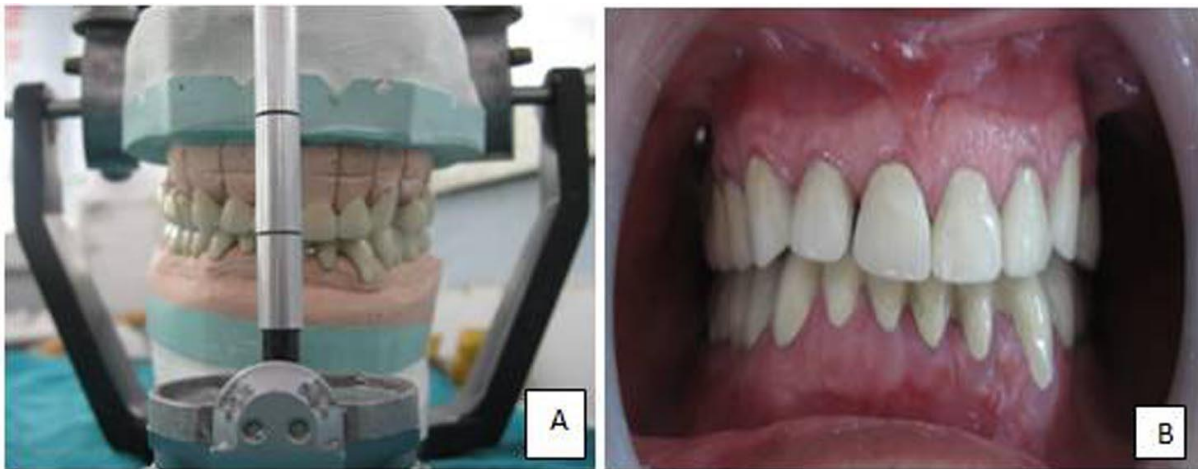


Figure 3: (A) Final prosthesis on a semi-adjustable articulator, (B) Final cementation of the crowns with luting glass ionomer cement

Definitive Restorations

Then the casts were mounted on a Hanau arcon articulator using a face bow (Hanau Springbow) and for centric inter-occlusal record the one side arch provisional restorations were removed and bite record were made with the jet bite rubber base material then the other side arch provisional's were removed and the bite record were relined, with previously determined vertical dimension.

The occlusion was evaluated, the provisional crowns on the mandibular canines were removed first in order to develop posterior guidance by analysis of the second cuspid guidance (first premolar), third cuspid (second premolar), and fourth cuspid (first molar).¹¹

Wax pattern were made and cast, the metal copings were tried in the mouth for the fit and extension of the margins and adjusted as needed for occlusal clearance and proximal contact. The shade was selected and porcelain baked to the metal with proper contour and incisal translucency. Final crowns were placed on semiadjustable articulator to check for occlusal discrepancy before final cementation (Fig 3A). Permanent cementation (Fig 3B) was done with glass ionomer type I (GC GoldLabel, GC Corp., Tokyo) luting cement. Oral hygiene instructions were given with proper brushing technique habits

and the use of dental floss and interdental brushes.¹²

DISCUSSION

The etiology of tooth wear is multifactorial and clinical controlled trials of restorative and prosthodontic approaches are limited in quantity and quality. In addition, lack of evidence regarding the long-term outcomes of treatment methods and materials cause difficulty in clinical decision-making.¹³

The increase of VDO was determined not by standardized esthetic golden proportion of anterior teeth but by patient's physiologic factors like interocclusal rest space and speech. If the increase of VDO was decided arbitrarily without close evaluation, multiple complications would happen and longer treatment period might be needed. Depending on the patient's situation and adaptation ability, the interim period can be modified and the careful evaluation and monitoring may shorten the overall treatment duration.¹⁴

In our case the patient was presented with a couple of other treatment options. One of the options was to remove all the teeth and prepare a full denture for both the arches. Another treatment option was saving a few of the posterior teeth and extracting all the other teeth and making a

removable partial denture after increasing vertical dimension by crowns. Third option was extraction of some teeth followed by overdenture. Fourth option was to restore the entire dentition with porcelain fuse to metal crown by increasing the vertical dimension.

The patient refused to get his teeth extracted. He was interested on saving all the teeth and was prepared to undergo any amount of extensive treatment to achieve the end result. As the patient didn't have any decayed/grossly decayed and periodontally compromised teeth, it was planned to restore the entire dentition with porcelain fuse to metal crown by increasing the vertical dimension of occlusion by 2mm. This necessitated full occlusal coverage restorations for all the teeth. The vertical dimension had to be reestablished, while at the same time balancing the occlusion on both the sides. The most difficult aspects of treating the case were to establish intercuspation and to simultaneously establish a comfortable vertical dimension for the patient.

This was a complex and lengthy procedure which was completed in 4 months. Teeth required crown lengthening, root canal treatment, post – core and crown restoration. As the patient had edge to edge bite and lost vertical dimension, it was difficult to establish harmonious intercuspation and esthetics.

In this case report we increased the vertical dimension by 3mm with the use of overlay splint for a period of 8 weeks and after the crown preparations were finished provisionals were made and temporarily cemented for a period of 1 month. During this 4 month period patient did not report any discomfort and muscle fatigue. The parafunctional habits were reduced by providing anterior guidance and by eliminating the occlusal interferences. In the reestablishing of vertical dimension and freeway space, phonetics was not considered.

According to several investigations, the clinical rest position changes with the vertical dimension of occlusion in an initial adaptation.^{15,16} Studies of methods for increasing the VDO indicate that the use of fixed prostheses causes less severe symptoms than the use of removable appliances. A feasible alteration is increasing the VDO up to 5 mm intrinsically. It is expected that patients can adapt

to an alteration in this zone. A greater increase in the VDO may not be hazardous, but it may make the rehabilitation more complex.⁵

Through a systemic approach to record taking diagnosis, treatment planning, application of fundamental concepts of occlusal, treatment delivery, reassessment of functional esthetic results, a predictable long term restoration of worn dentition can be achieved.⁸

CONCLUSION

The restorative and preventive treatment procedure for the worn dentition should be compatible with periodontal and pulpal health. It is necessary to understand the pathology of occlusion, material science, clinical technique and skill of the operator. We opted for root canal treatment followed by crown as the patient was not willing for extraction or use of any removable prosthesis. Other more conservative and less expensive treatment options such as overdenture, cast partial denture or complete denture may also be considered for periodontally compromised conditions. Follow-up visits play a very important role for the success of such treatment options.

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