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Short communication

Restoring the Vertical Dimension in Case with Missed Posterior Teeth and Severe Attrition: A Case Report

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ABSTRACT

The occlusal vertical dimension (OVD) has frequently been a source of conflict in restorative dentistry. The OVD may be changed to enhance occlusal interactions, integrate dentofacial esthetics, or provide room for intended treatments. The OVD should not be viewed as an immutable guidance, but rather as a dynamic dimension within a range of physiological tolerance that can be changed over period of time as the dentist stays within the function envelope. Because of the original references, vertical modifications in the maxilla-mandible connection may have biological, biomechanical, esthetic, and three-dimensional (3D) functional impacts. This clinical case report details the treatment plan of a patient who had a favorable clinical outcome after reconstructing the vertical dimension with a boost in esthetics and function illustrates the treatment of a patient. This patient was clinically evaluated for three months to assess TMJ adaptation to a posterior removable partial denture (RPD) and resin composite anterior fillings.

Keywords: missed posterior teeth, loss of vertical Dimension, worn Dentition.

1. Introduction

Scientific Background:

The progressive attrition of the occlusal surfaces of enamel is a typical process that occurs throughout the life of a person. Severe occlusal wear, on the other hand, can cause occlusal disharmony, poor function, and esthetic deformity **[1]**.

Modifying the occlusal vertical dimension (OVD) has long been a point of contention in restorative dentistry. When it is required to balance dentofacial cosmetics, give area for future repair, or enhance occlusal relationships, the OVD could be modified. The OVD is an ever-changing aspect within a physiological endurance range that can be adjusted while the dentist adheres to the function envelope **[2]**.

Rationale:

When there is not enough room for restoration, rehabilitation of extremely worn teeth is difficult, and handling of wear teeth with removable device is complicated. The evaluation of the vertical dimension is crucial for management, and every case requires an in-depth comprehensive treatment plan **[3]**. The main reasons for raising the vertical dimension are: a) harmony in dentofacial esthetics; b) providing enough room for the restorative material; and c) improving incisal and occlusal relationships. This clinical report describes the treatment of a case monitored to assess the adjustment to a posterior removable partial denture (RPD) and the provisional anterior restorations for 3 months trial period.

2. Patient Information

A 62-year-old woman came for treatment of sever attrition. Her main complaint was that she had difficulty eating anything since her lower posterior teeth had fallen out and her anterior teeth had worn down. She was diabetic and taking an analgesic for idiopathic head pain. Intraoral assessment showed a localized anterior loss of tooth substance in the upper and lower dentition, with the maxillary upper right anterior teeth showing the most loss. Because the mandibular posterior teeth were absent, the upper anterior teeth had sharp enamel borders and attritional wear. **Figure 1**.

Figure 1. Teeth attrition due to loss of posterior support

3. Clinical Findings

Extraoral examination revealed that she has an oval facial type and there was loss in the vertical dimension. The patient complained of temporomandibular pain, headache, and masticatory muscle soreness, but the difference between centric occlusion (CO) and maximum intercuspation was discovered when she was directed to CR using bimanual technique.

To determine if VDO had been altered, the following points were detected:

1. Mandibular posterior teeth were missing, resulting in a loss of posterior support. Excessive wear and fracture of anterior teeth resulted from posterior collapse.

2. Wear history: The patient was a dressmaker who used to hold metallic objects in her front teeth.

3. Phonetic evaluation: A normal (s) sound is produced when the distance between the incisal edge of the mandibular incisors and the lingual surface of the maxillary incisors is approximately 1 mm. Sound was altered by the patient's increased space.

4. Wrinkles, loss of vertical dimension, and falling commissures around the opening to the mouth were noticed.

The possible causes of a patient’s worn dentition that might include parafunction, eating habit, or dental care ignorance were explained to the patient.

The possibilities for treatment included returning the mandibular edentulous posterior region with implants or a removable partial denture to obtain a posterior stopper, followed by restoring the worn anterior teeth with indirect ceramic or direct resin composite restorations with crown lengthening. Because the patient was contraindicated for implant due to uncontrolled diabetes, implant installation was ruled out. Furthermore, the patient refused to have any teeth reduction or crown lengthening procedures performed to restore the worn teeth. Following clinical evaluation of reduced VDO, full mouth rehabilitation with increasing VDO was planned using lower posterior RPD and

anterior resin composite restorations after TMJ and muscles had adapted to the recently introduced vertical dimension.

4. Timeline

The control phase was established in 2 weeks. Then the holding phase for patient's acceptance to the raised VDO was assessed over the course of a three-month period. After this period there was no evidence of pain in the muscles or temporomandibular annoyance. The definitive phase was applied in 2 weeks.

5. Therapeutic Intervention

A. Control Phase: -

1. Scaling & oral hygiene measures.

2. Vertical dimension raise.

3. Smile design.

4. Design & 3D printing of removable partial denture.

5. Mockup for all teeth and partial denture placement and temporization for new design & VD raise.

1. Scaling & oral hygiene measures:

Prophylactic scaling and polishing were done to maintain proper oral hygiene and the final shade for the teeth during the resin composite restorations. After that, oral hygiene measures as soft toothbrush, toothpaste and antiseptic chlorohexidine mouthwash were prescribed for the patient for 1 week period.

2. Vertical dimension raise:

. The patient's centric relation (CR) record was taken by using the ‘bimanual manipulation technique where the clinician was directly behind the supine patient with the patient’s chin pointed upwards. The clinician gently helps guide the mandible into the CR by placing their thumbs on the patient’s chin and fingers on the lower border of the mandible in presence of mandibular trial denture base and occlusion wax blocks **Figure 2**.

Figure 2. CR record by trial denture base and occlusion wax blocks

The patient's casts were fixed on a semi-adjustable articulator and a face-bow record and an interocclusal record were made with the aid of occlusal bite registration material. The new VDO was set by increasing it by 1.2 mm using the leaf gauge **Figure 3**. VDO was increased not by a standardized esthetic golden proportion of anterior teeth, but by physiologic factors such as interocclusal rest space and speaking.

Figure 3. Leaf gauge used to determine the new VDO

3. Smile design:

Scanning for the mounted casts was done and smile design was done for upper and lower anterior teeth in the new vertical dimension to ensure that the gained space was enough for the new restorations **Figure 4**. After the proper design, 3D printed upper and lower arches were fabricated and rubber base index was fabricated for each arch for temporization step.

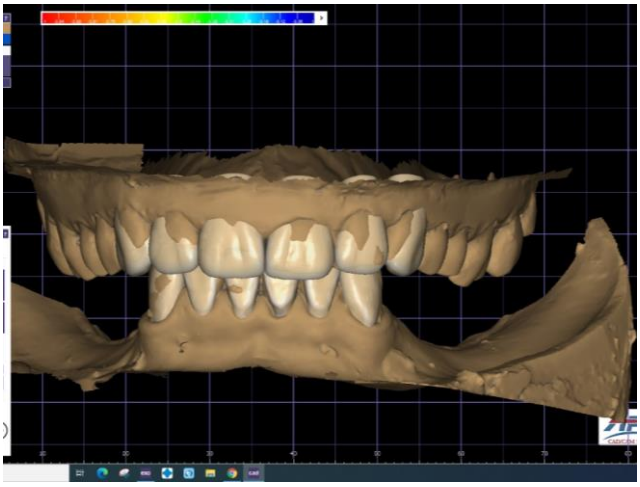

Figure 4. Smile design for upper and lower anterior teeth

4. Design & 3D printing of RPD:

The mandibular provisional RPD was designed in the new customized vertical dimension to act as a posterior occlusal stoper to maintain the anterior space for anterior mockup restorations **Figure 5**.

The patient was told to keep the RPD in place for three months. During this time, the patient's state and functions were assessed, including muscle discomfort TMJ pain, mastication, the range of mandibular motions, swallowing, and speech. Mastication and speech enhancement verified the patient's acceptance to the new mandibular position with the restored VDO.

Figure 5. Mandibular provisional RPD

5. Mockup for the anterior teeth:

Rubber base index was used for each arch to fabricate the temporary anterior restorations by using *(Provi Temp K)* resin material. The temporary restorations were modified and utilized as a guide for the final oral rehabilitation **Figure 6**.

Figure 6. Mockup for the upper anterior teeth

B. Holding Phase: -

1. Continue the oral hygiene measures: make sure the patient is following oral hygiene measures by examining plaque accumulation on teeth surfaces.
2. Inspect the new design and the vertical dimension: the patient's acceptance to the raised VDO was assessed over the course of a three-month period. There was no evidence of pain in the muscles or temporomandibular annoyance.

C. Definitive Phase: -

1. Removable partial denture fabrication:

Following the wax denture trial, the final mandibular RPD was manufactured and delivered with little occlusal modification. The posterior molars supported the bite force and oral hygiene instruction, as well as regular check-ups **Figure 7**.

Figure 7. Definitive mandibular RPD

2. Resin composite restoration on upper and lower anterior teeth:

Final cavity preparation was performed, and definitive resin composite restoration was done in the upper and lower anterior teeth. Multi-shading restorations were fabricated in the upper arch by using *(z350 xt 3M ESPE)* nano-filled resin composite (Enamel A3 and Body A2) **Figure 8**.

Figure 8. Definitive resin composite restorations

6. Follow-up and Outcomes

The applied treatment plan was assessed for 6 months follow-up period for any complications. During this period, the outcome for patient satisfaction in the form of esthetic appearance of the anterior teeth and the masticatory function was evaluated. There were no occlusal interferences during different mandibular movements or TMJ and muscle pain.

7. Discussion

Because of the efficiency and cost effectiveness, the rehabilitation utilizing anterior tooth restoration and RPD providing posterior support is feasible and preferred by numerous patients who need the treatment of tooth wear **[4]**.

However, if the patient fails to retain the RPD or resorption of residual ridge continues, the restored anterior teeth could be rapidly subjected to excessive occlusal loads. As patient acceptance with free-end saddle dentures has been stated to be low, RPD awareness is required. Occlusal modifications and RPD fitting must be checked on a regular basis.

In this case, the use of temporary partial denture was the final step for restoring the missed posterior teeth. Due to the diabetic medical history, the use of other treatment options as implants insertion or vitalium partial denture was contraindicated. At the same time the use of flexible partial denture was without any added values as the presence of retentive clasps was not an esthetic problem.

The nano filled resin composite *(z350 xt 3M ESPE)* was used due to its high mechanical and esthetic properties. It was used for layering technique for improving the teeth shade matching for higher esthetic outcome **[5]**.

In the present case, the loss of posterior teeth causing a lack of stability leads to excessive mandibular load on some points of occlusion of the teeth, causing wear. The designed treatment focused on restoring the biological, mechanical, and esthetic pillars for the patient.

For the biological aspect, overload on TMJ, muscle pain, incorrect mandibular movement and associated clicking sounds were corrected by increasing the OVD. This prevents further damage to the joints and muscles in addition to stopping the damage to the existing remaining tooth structure.

From the mechanical point of view, the presence of posterior stoppers in form of RPD offered stability for the occlusion which enhanced the occlusion and chewing ability of the patient. This was reflected on the mechanics of the TMJs and provided a healthy environment for articulation. In addition, the sounds of the pronounced letters were improved and corrected due to corrected anterior teeth repositioning of their incisal edges.

The correction of esthetic alterations by direct restorative procedures creates a sound harmony for the patient smile. Repositioning of the esthetic facial parameters as the upper and lower lip position in relation to the restored teeth enhanced the appearance and increased the patient self-confidence.

At the end, the outcome of the treatment plan was followed for 6 months for any complications. During this period, the outcome for patient value was achieved. The overall patient satisfaction about her corrected appearance and the restored masticatory function with no occlusal interferences during different mandibular movements or TMJ and muscle pain.

8. Informed Consent

Preceding the initiation of this treatment, the whole plan was explained to the patient and finally a verbal and written consent was obtained and signed.

9. Conflict of Interest

There is no conflict of interest, no funding or material supply from any parties.

10. References

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