

# Prosthodontic Rehabilitation by Increasing Vertical Dimension: Case Report

## Vertikal Boyut Yükseltilerek Yapılan Protetik Rehabilitasyon

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**ABSTRACT** Tooth wear can be classified according to its cause; attrition, abrasion and erosion. Tooth wear is considered pathologic when an intervention is necessary for cosmetic or functional purposes. It is important to determine the factors of tooth wear for treatment protocols. A differential diagnosis is not always possible because there may be a combination of these processes occurring. Lost of vertical dimension can cause loss of posterior support, reduce of interocclusal distance and change of facial appearance. Loss of tooth structure does not necessarily mean loss of vertical dimension of occlusion. Loss of vertical dimension of occlusion caused by physiologic tooth wear is usually compensated by continuous tooth eruption and alveolar bone growth. In this case report, a treatment to recover lost of masticating function and vertical dimension has been described that a patient who has excessive wear of the teeth.

**Key Words:** Vertical dimension; esthetics

**ÖZET** Diş aşınmaları atrisyon, abrazyon ve erozyon şeklinde görülebilir. Bu durum fonksiyonel ya da kozmetik amaçlı tedaviler gerekli olduğu hallerde patolojik olarak kabul edilmektedir. Tedavi protokolü açısından diş aşınmalarının faktörlerini tanımlamak önemlidir. Ayırıcı tanı her zaman mümkün olmamaktadır, çünkü sonuç, bu süreçlerin kombinasyonu şeklinde de olabilir. Vertikal boyutun kaybı, posterior desteğin kaybolması, interokluzal aralığın azalması ve yüz görünümündeki değişiklikler nedeniyle olabilmektedir. Diş yapısının kaybı her zaman okluzyon dikey boyutunun kaybı anlamına gelmemektedir. Fizyolojik diş aşınmalarının neden olduğu okluzyon dikey boyutu kaybı genellikle dişlerin uzaması ya da alveoler kemiğin gelişmesi ile sonuçlanan çeşitli mekanizmalarla kompanse edilmektedir. Bu klinik olguda, dişlerinde aşırı aşınma meydana gelen bir hastanın kaybettiği dikey boyutunu ve çiğneme fonksiyonunu yeniden kazan-dırmak amacıyla yapılan protetik tedavi anlatılmaktadır.

**Anahtar Kelimeler:** Dikey boyut; estetik

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Prolonged tooth retention by the aging population increases the likelihood that clinicians may treat patient with advanced levels of wear. Tooth wear is considered pathologic when an intervention is necessary for cosmetic or functional purposes.<sup>1</sup> This pathologic wear includes endogenous and exogenous factors.<sup>2</sup>

Tooth wear can be classified according to its cause; attrition, abrasion and erosion.<sup>3</sup> Erosion, the loss of hard tooth substance due to a chemical process not involving bacterial action; attrition, tooth structure loss by wear

of tooth surface or restoration caused by tooth-to-tooth contact during mastication or parafunction; abrasion, a pathologic tooth wear caused by the frictional action of a foreign body on the teeth.<sup>4</sup> The another type of tooth wear is abfraction.<sup>4-8</sup> Abfraction has been described as wedge-shaped defects and noncarious cervical lesions.<sup>9-13</sup> Stress-induced cervical lesions have also been called abfraction.<sup>14,15</sup> The management of tooth wear, especially attrition, is becoming a subject of increasing interest in the prosthodontic literature, both from a preventive and a restorative point of view.<sup>16</sup>

A differential diagnosis is not always possible because there may be a combination of these processes occurring.<sup>17-20</sup> It is important to determine the factors of tooth wear for treatment protocols.<sup>2</sup> Loss of tooth structure does not necessarily mean loss of vertical dimension of occlusion (VDO).<sup>21</sup> Loss of VDO caused by physiologic tooth wear is usually compensated by continuous tooth eruption and alveolar bone growth. In situations where tooth wear exceeds compensatory mechanism, loss of VDO occurs. Because of this, it may be difficult to determine if vertical dimension has lost. Therefore, VDO should be conservative and should not be changed without careful approach.<sup>22,23</sup> Especially, increasing the VDO in bruxers puts a severe overload on the teeth and sometimes results in the destruction of the restorations or teeth themselves.<sup>22</sup>

Loss of vertical dimension causes loss of posterior support, reduce of interocclusal distance and change of 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, decreased masticatory efficiency and the presence of angular cheilitis are typical facial aspects associated with overclosure).<sup>24,25</sup> In addition, loss of tooth tissue from bruxism has been caused various dental problems such as tooth sensitivity, excessive reduction of clinical crown height and possible changes of occlusal relationship.<sup>26</sup>

Sometimes, clinicians are faced with the challenge of restoring severely worn dentition. An im-

portant aspect for successful treatment of these patients is to determine the occlusal vertical dimension and the interocclusal rest space. A systematic approach to managing this type of complete oral rehabilitation can lead to a predictable and favorable treatment prognosis.<sup>27</sup>

The increase in OVD is achieved either with a removable acrylic resin occlusal splint or with these of provisional restorations. Throughout the provisionally treatment, patients must be followed periodically.<sup>20,28-30</sup>

While restoring of worn teeth, it is not enough just only to increase the vertical dimension. When there is not enough amount of sufficient height or length of crown, endodontic treatment and post-core application may be necessary. Today, the success of therapy is increasing with the development of post-core.<sup>31</sup>

In our case, a patient who has excessive wear of the teeth and loss of masticatory function has been treated by increasing vertical dimension. And in this report, our treatment method was described.

## CASE REPORT

A sixtyseven-year-old patient applied to the prosthodontic department of the Dentistry School of Erciyes University in order to get rehabilitation of his absent teeth. His chief complaint was that he could not eat anything because his teeth were worn too much. The patient had no systemical diseases. At intraoral examination there was partial edentulism. There were crowns, made by metal and plastic which had had not harmony with gingiva at teeth numbered 33,43,47. At other teeth there was too much attrition because of posterior edentulism, sagging which had no antagonist, and there was sagging around tuber maxilla (Figures 1-4).

The patient was informed about the procedures and complications of the treatment and he accepted all of the procedures.

In this treatment fiber-reinforced posts were used. Because elastic modulus of fiber posts is closely to dentine than all metal posts. Implant supported fixed partial denture and classic removable



FIGURE 1: Partial edentulism, front view.



FIGURE 2: Partial edentulism, side view.



FIGURE 3: Too much attrition.



FIGURE 4: Metal-plastic crowns.

partial denture were thought as treatment choices. The patient preferred the combination of fixed partial denture with removable partial denture because of economical reasons.

It was decided to arise vertical dimension as there was not enough space at anterior and posterior regions for denture and also free way space was 3 mm. For this reason a model created by using size of teeth. Transparant plaque (occlusal overlay splint) was created. Then two points were signed and measured. To arise the vertical dimension for 3 mm, acrylic resin was added to the transparent plaque. It was advised to the patient using the plate all time dining out (Figure 5,6).

Patient was called to the clinic during a week two days apart. It was learnt that if he had any problem around temporomandibular joint (TMJ) and any complaint, after learning that he had no

problem, vertical dimension was raised 1 mm again. Then he was called to be controlled 15 days later to learn if he had any problem or not. After third fifteen-day-control transparent plaque was removed and composite was added onto anterior teeth for keeping the same vertical dimension (Figure 7).

The patient used temporary prosthesis at the created vertical dimension and he was called to the controls after a week, after fifteen days and after a month (Figure 8). He used the temporary prosthesis for three months.

To create the enough space for fixed denture; teeth numbered 22,23,25 restorated by using fiber posts and composite. Crowns from the teeth numbered 33,43,47 were taken off. There were decays at the teeth numbered 43, 47 and the tooth numbered 47 was restorated with glass ionomer cement

after the periodontal surgery. Then the teeth are prepared carefully (Figure 9).

There was no complain or pain or TMJ dysfunction, the teeth were prepared for final restorations (Figure 10).

Metal-ceramic restorations were used at the upper and lower jaws in created vertical dimension. Conventional removable partial prosthesis was used for edentulous area at mandible. And bilateral balanced occlusion was formed (Figures 11-13).

The patient was called again for control. There was only prosthesis irritation which had been eliminated. He came to control 5 months later. And there was a little gingival recession which was about 0.5 mm.

## DISCUSSION

Vertical dimension by the simplest definition is the vertical relationship between the maxilla and mandible. Terms such as VDO and vertical dimension at rest (VDR) are prosthodontic terms that refer to the vertical dimension measured with the maxillary and mandibular teeth in occlusion and at the postural rest position of the mandible respectively.<sup>32</sup> Vertical dimension can also be describes lower facial height using the distance between the anterior nasal spine (ANS) and gnathion.<sup>33</sup> These definitions indirectly describe the functional length of the jaw closing muscles either when the teeth are in contact or in the rest position. Due to the different etiological factors, the change in occlusal vertical dimension, are restored with prosthetic treatment.<sup>34</sup> It is important to emphasize the relationship between the jaw muscles and maxillomandibular relationships because the jaw musculature acts as a primary determinant of vertical dimension or lower facial height.<sup>35</sup>

There are many of the methods for assessing vertical dimension such as; pre-extraction records in determining vertical dimension, using physiologic rest position as a guide to the vertical dimension of occlusion, measurement of closing forces to establish vertical dimension, tactile sense in establishing vertical dimension, facial dimen-



FIGURE 5: Transparant plate.



FIGURE 6: Transparant plate for arise vertical dimension.



FIGURE 7: Composite was added anterior teeth.



FIGURE 8: Temporary prosthesis.





FIGURE 9: Fiber posts.



FIGURE 10: Prepared teeth.

sions in establishing vertical dimension, phonetics in establishing the occlusal vertical dimension, deglutition in establishing vertical dimension, open-rest method in establishing vertical dimension.<sup>36-44</sup>

The treatment of a severely worn dentition is classified by Turner in 1984. His classification and conventional treatment includes increasing VDO with multiple crown-lengthening procedures, orthodontic movement, surgical repositioning of a segment of teeth and supporting alveolar bone, and placement of crowns and fixed/removable partial dentures.<sup>20,45</sup> However, tooth wear's etiology is multifactorial; restorative and prosthodontic approaches are limited.<sup>46</sup> It is crucial to define the cause of wear before intervention to help improve the effectiveness of any preventive and restorative care.<sup>47</sup> The etiology of occlusal wear for our patient is not totally clear. It can be hypothesized that the patient

had parafunctional occlusal habit, he lost posterior teeth and started grinding his anterior teeth. When the anterior teeth got worn, he lost anterior guidance and developed posterior interferences. The posterior interferences in lateral excursions can activate the muscles of mastication; so, the patient can generate more forces his teeth more aggressively.<sup>48</sup>



FIGURE 11: Metal structure of ceramic restorations.



FIGURE 12: Metal ceramic restorations.



FIGURE 13: Final restorations.

For our patient, implant treatment had been eliminated because of economical reasons. So, the conventional treatment model that includes a trial overlay splint (transparent plaque), adding composite onto the teeth, provisional restorations, and final prosthesis, were chosen.

In previous literature, the wearing time of overlay splint and temporary prosthesis is various. The trial period of overlay prosthesis is between 3 weeks and 5 months, and fixed or removable provisional prosthesis is 2-6 months.<sup>1,20,30,49</sup> In this case, the patient was monitored for 45 days to evaluate the adaptation to the removable occlusal splints. Also the patient's adaptation to the temporary removable partial denture was monitored for 3 months. In our case; the time of wearing temporary prosthesis was relatively shorter than the other case report, but complain, pain, and TMJ dysfunction were not observed during that period. If the increase of VDO was decided arbitrarily without close evaluation, several complications would happen and longer treatment period might be

needed. Depending on the patient's adaptation ability, interim period can be modified.<sup>46</sup> The rehabilitation using restoration of anterior crowns and removable partial denture is affordable and common for many patients because of economics and traditional reasons.<sup>50</sup>

In our case, we restored the occlusion in a new vertical dimension. The use of a provisional occlusal splints and removable prosthesis are generally considered in the treatment of unsuitable horizontal and vertical maxillomandibular relationships.<sup>28</sup> Similarly, the combination of occlusal splint and temporary removable partial denture were used in the treatment.

Treatment of patients who have worn dentition is difficult. Accurate clinical and radiographic examinations, and determining OVD are important. In this clinical report, increasing vertical dimension of occlusion using occlusal overlay splint and provisional removable partial denture showed successful rehabilitation for severely worn dentition.

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