Prosthodontic Rehabilitation by Increasing Vertical Dimension: Case Report

Vertikal Boyut Yükseltilerek Yapılan Protesik Rehabilitasyon

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Geçilmiştir/Received: 24.06.2011
Kabul Tarihi/Accepted: 03.01.2012

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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. Loss 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


Anahtar Kelimeler: Dikey boylam; estetik

Turkiye Klinikleri J Dental Sci 2015;21(2):166-72

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. This pathologic wear includes endogenous and exogenous factors.

Tooth wear can be classified according to its cause; attrition, abrasion and erosion. 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;
abrasions, a pathologic tooth wear caused by the
frictional action of a foreign body on the teeth.4
The another type of tooth wear is abfraction.4-8
Abfraction has been described as wedge-shaped
defects and noncarious cervical lesions.9-13 Stress-
induced cervical lesions have also been called
abfraction.14,15 The management of tooth wear, es-
pecially attrition, is becoming a subject of increas-
ing interest in the prosthodontic literature, both
from a preventive and a restorative point of view.16

A differential diagnosis is not always possible
because there may be a combination of these
processes occurring.17-20 It is important to determine
the factors of tooth wear for treatment protocols.2
Loss of tooth structure does not necessarily mean
loss of vertical dimension of occlusion (VDO).21
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. There-
fore, VDO should be conservative and should not
be changed without careful approach.22,23 Espe-

cially, increasing the VDO in bruxers puts a severe
overload on the teeth and sometimes results in the
destruction of the restorations or teeth them-

Lost of vertical dimension causes loss of poste-
rior support, reduce of interocclusal distance and
change of facial appearance (diminished facial con-
tour, commissures of the mouth turned down, thin
lips, loss of muscle tone with the face appearing
flabby instead of firm, decreased masticatory effi-
ciency and the presence of angular cheilitis are typ-
ical facial aspects associated with overclosure).24,25
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 rela-

tionship.26

Sometimes, clinicians are faced with the chal-

enge of restoring severely worn dentition. An im-
portant aspect for successful treatment of these pa-
tients is to determine the occlusal vertical dimen-
sion and the interocclusal rest space. A systematic
approach to managing this type of complete oral
rehabilitation can lead to a predictable and favor-
able treatment prognosis.27

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 been fol-
lowed periodically.20,28-30

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 develop-
ment of post-core.31

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 eden-
tulism. There were crowns, made by metal and
plastic which had not harmony with gingiva
at teeth numbered 33,43,47. At other teeth there
was too much attrition because of posterior eden-
tulism, sagging which had no antagonist, and there
was sagging around tuber maxilla (Figures 1-4 ).

The patient was informed about the proce-
dures 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 sup-
ported fixed partial denture and classic removable
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.32 Vertical dimension can also be describes lower facial height using the distance between the anterior nasal spine (ANS) and gnathion.33 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.34 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.35

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

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.20,45 However, tooth wear’s etiology is multifactorial; restorative and prosthodontic approaches are limited.46 It is crucial to define the cause of wear before intervention to help improve the effectiveness of any preventive and restorative care.47 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.48

FIGURE 9: Fiber posts.

FIGURE 10: Prepared teeth.

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.\(^1,2,30,49\) 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.\(^46\) The rehabilitation using restoration of anterior crowns and removable partial denture is affordable and common for many patients because of economics and traditional reasons.\(^50\)

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.\(^28\) 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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