

Justification for Altering the Vertical Dimensions of Occlusion with Case Reports

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Abstract

In many cases it is possible to increase the vertical dimension of occlusion if two foundational principles are maintained. The starting point for reconstruction of the vertical dimension of occlusion must be with the mandibular condyles in centric relation. Reconstruction must be within range of neuromuscular adaptation for each individual patient.

Keywords: Vertical dimensions; Alteration; Loss of vertical dimension; Evaluation of vdo; Increase of vertical dimensions

Introduction

According to Silverman [1]

- The occlusion must not be built up to increase the vertical dimensions.
- As teeth wear or become abraded, the teeth and alveolar bone elongate through growth to maintain the original vertical dimension.
- Whether or not the vertical dimensions can be increased must be determined by scientific facts and not options.

Definitions

Vertical dimension is the distance between two selected anatomic or marked points (usually one on the tip of the nose and the other upon the chin), one on a fixed and one on a movable member [2]. Occlusal vertical dimension (OVD) is the distance measured between two points when the occluding members are in contact. Patients with severely worn dentition and loss of posterior teeth may result in reduced OVD and these patients often need rehabilitative treatment [3].

Evaluation of Vertical Dimension of Occlusion

There has never been a scientific, practical and accurate method by which vertical dimension of the patient could be recorded. Assessment of the rest vertical dimension is one way to clinically evaluate the OVD. The drawback of this technique is that interocclusal distance may be variable. Classic techniques have been used to determine the vertical dimension of occlusion like phonetics, interocclusal distance, facial soft tissue contour, cephalometrics, electromyography and patient's neuromuscular perception. However, there is no absolute method to determine an acceptable OVD. Amongst techniques mentioned, speech and function can be used to clinically evaluate an acceptable OVD. The speaking method is a physiologic phonetic method which measures vertical dimension by means of the closest speaking space.

There are Various soft tissue contours that are used in evaluating OVD include the golden rule, profile, contour of the lips and old photographs. Alterations in the vertical dimension of occlusion have often been suspected of changing the neuromuscular response and biomechanical relationship of the mandible. Although increases in the vertical dimension of occlusion have been advocated as a therapeutic measure to relieve symptoms from temporomandibular joint (TMJ) disorders in humans.

It was felt that collapsed cases with wear of natural dentition had to be re-constructed to the patients supposed normal vertical dimensions.

There has been scientific, accurate and practical methods by which the vertical dimensions of the patients could be recorded in millimeters so that we could determine whether vertical dimensions has been reduced over period of years. Kazis and Albert [4] stated that treatment of reduced vertical dimension is not designed to increase the vertical dimension beyond the normal, but is intended to restore the amount of vertical dimension that has been lost. A young person will tolerate a greater correction of vertical dimension and become adjusted more easily to a reduction in the interocclusal distance as necessitated by the changes. Silverman [5,6] said that closest speaking space can range from 0-10 mm in different patients and that there is no average closest speaking space. But it is constant in an individual. Vertical dimension must not be increased beyond the normal for each patient. Increasing the vertical dimension only 1mm will cause discomfort to the patient. It is better to use a vertical dimension that is too small than to use one that is too great. Landa [7] stated that increasing the vertical dimension places the muscles of mastication and temporomandibular joint under strain. The crown to root ratio is also affected and hence 'bite raising' is contraindicated. Dawson [2]. Increase in vertical dimension interferes with the optimum length of the resting muscles which serve as a stimulus to produce hyper tonicity. Closing the vertical dimension does not interfere with muscle lengths. When it is not practical to restore severely worn dentition without restoring the vertical dimension to obtain space for the restorative material, the dimension can be increased to 1-1.5 mm.

To Restore At 'Increased' or 'Existing OVD?

The OVD determines facial proportions at maximum intercuspation and influences facial dimension at rest. The loss of alveolar bone due to any reason may result in loss of lower facial height and lead to signs of premature ageing. Increasing the vertical dimension of occlusion can have far reaching effects on facial aesthetics, not just on the peri-oral areas but on the whole face improving esthetics form and function. The rationale for altering OVD comprise of aesthetics, altering the occlusal relationship and for prosthetic convenience to allow space for restorations.

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It is important to establish the cause of wear before intervention to help improve the effectiveness of any preventive and restorative care [4]. The clinicians may decide to increase OVD based on the amount of interocclusal space required to restore the dentition to proper esthetics, form, and function. The preoperative figures show the decreased vertical dimensions due to early loss of teeth (Figures 1 and 2). The decision whether to restore at increased or existing OVD is made by assessing free way space (FWS) and dentoalveolar compensation. If an increase is indicated and performed, it should be followed up for several months to follow up the desired and undesired results.

When and How to Alter Vertical Dimension

In many cases it is possible to increase the vertical dimension of occlusion if two foundational principles are maintained:

The starting point for reconstruction of the vertical dimension of occlusion must be with the mandibular condyles in centric relation. Reconstruction must be within range of neuromuscular adaptation for each individual patient [2]. There is difficulty in determining both of these parameters on an individual patient basis. The accurately recording the centric reference point and transferring this information to an instrument that simulates the patient's functional occlusion is important to determine the outcome of treatment. As Dawson [2] points out, condylar access to centric relation is not dependent on vertical dimension, and increasing the vertical dimension does not unload joints if the starting point is centric relation position. Conventionally, increase in OVD is achieved either with a removable acrylic resin occlusal splint or with the use of provisional restorations, for example, direct bonded composite resin or provisional fixed restorations. The OVD can also be altered during splint therapy.

Disadvantages of removable occlusal splints include patient compliance and speech interference.

When and How to Alter Vertical Dimension

Rivera Morales and Norman [3] outline guidelines for restoration of vertical dimension that the careful mounting of study casts to a semi-adjustable articulator using jaw relation records (Figure 3). This process is followed by diagnostic wax up and diagnostic occlusal adjustment on duplicated mounted casts. In this regard, it is prudent to accurately access the status of structural occlusion in conjunction with dynamics of functional occlusion using sophisticated mounting procedures. The prudent course is to take a diagnostic approach and formulate a hypothesis based on information obtained from the history, clinical examination, and investigations of condylar position and status of the neuromuscular envelope. This hypothesis can then be tested using reversible intervention modalities such as occlusal splints, removable prostheses, or fixed transitional crowns prior to definitive alteration of the vertical dimension of occlusion (Figures 4-6). In the author's experience, creating a maximum opening of 1-3 mm at the articulator



Figure 3: Face Bow recording of Patient no. 1.



Figure 1: Preoperative intraoral view of patient No. 1.



Figure 4: Postoperative intraoral view of patient No. 1.



Figure 2: Preoperative intraoral view of patient No. 2.



Figure 5: Postoperative intraoral view of patient No. 1 in occlusion.



Figure 6: Postoperative extraoral view of patient No.2.

pin is all that is required to solve the most complex vertical challenge

Discussion

Okason [8] states that orthopedic stability exists when the stable intercuspal position of the teeth is in harmony with musculo skeletal stable position of condyles in the fossae.

Possible Clinical Problems Associated with Altered OVD

Clinical problems associated with altered OVD include joint or muscle pain, instability of altered OVD, impaired muscle activity and altered phonetics. Altering VD does not produce pain of more than one to two weeks which might be a result of increased temporary muscle awareness by the patient. Response after opening OVD may differ from patient to patient. Some can remain stable while others may relapse a lot.

Reasons to Change VDO

- To gain space for restorative material (prosthetic convenience).
- To improve esthetics without increasing functional risk.

Full mouth rehabilitation of a patient with severely worn dentition may require alteration in OVD to restore the dentition to an ideal form and function. Increasing the OVD becomes necessary in those cases where interocclusalspace problems or aesthetic considerations are especially critical. In such instances, there need not be undue hesitation

in increasing the OVD. Loss of tooth structure does not necessarily mean loss of OVD. Carlsson et al. [9] increased the vertical dimension in natural dentition by cementing acrylic resin splints in lower canines, premolar sand molars for 7 days. He found that subjects experienced moderate symptoms of discomfort initially but symptoms decreased later and no clinically demonstrable symptoms were found. He concluded that moderate increase in vertical dimension of occlusion does not create problem provided that occlusal stability is provided.

Sicher and Silverman [10,11] concluded that as the teeth wear or become abraded, the teeth and alveolar bone elongate through growth to maintain the original vertical dimension with the maintenance of the same closest speaking space. However, occlusal wear may occur more rapidly than continuous eruption depending upon the etiology of the wear [12].

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