

REVIEW ARTICLE

VERTICAL DIMENSION AND TMJ

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ABSTRACT:

Vertical dimension is in reality the most fundamental consideration in treatment planning. The recording of jaw relations in the treatment of edentulous patients aims at facilitating the adaptation of the complete dentures to the masticatory system to give an optimal and comfortable function. To achieve this goal, the recording must include an appropriate vertical dimension of occlusion and stable occlusal contacts in harmony with the TMJ, masticatory muscle functions and finally with the relationship between the prosthesis and the oral and the facial musculature. This article will review the literature regarding the effect of altering the OVD on the health of TMJ.

Key words: Vertical, Dimension

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INTRODUCTION

*"The clinician who only looks at occlusion is missing as much as the clinician who never looks at occlusion"*¹

- Jeffery.P. Okeson

The *Glossary of Prosthodontic Terms(GPT-9)* defines the vertical dimension as the distance between two selected anatomic points. The vertical dimension when the mandibular teeth are occluding with the maxillary teeth is defined as the occlusal vertical dimension (OVD).²

The OVD for dentate individuals is mainly determined by the remaining dentition, hence loss of tooth substance might influence the OVD.

Determining the vertical dimension of occlusion is a critical procedure for a totally or partially edentulous patient. Many edentulous patients have adapted to a vertical dimension which has decreased due to bone resorption and posterior tooth wear. Restoring the proper vertical dimension is further complicated because the rest position may be subject to change. Traditionally, it has been believed that changing the occlusal vertical dimension (OVD) is a precarious dental procedure causing problems such as muscle pain, temporomandibular joint pain, headaches, tooth grinding and clenching.

In the first decades of the last century, some authors expressed their concerns about the 'dangers' of altering the OVD. They hypothesized that changing the OVD caused physical suffering due to muscle strain. These authors believed that shortening of the lower third of facial (a decrease in the OVD) was a product of natural adaptation. Therefore, restoring this vertical dimension (e.g. edentulous patients) was an extreme dental treatment that went against the delicate balance of the stomatognathic system. Additionally, some decades later, several authors reported that creating an inadequate OVD by either increasing or decreasing it could create serious problems. They believed the OVD was a specific and fixed value that cannot be changed and that this value should be carefully and accurately calculated so that it will not be altered when treating patients.

Despite the fact that these conclusions were based solely on opinions and/or case reports, these beliefs have remained throughout the decades. It has since been believed that altering the OVD leads to the development of signs and symptoms of temporomandibular disorders (TMD). According to the Guidelines of the American Academy of Orofacial Pain temporomandibular disorders (TMD) are defined as 'a collective term embracing a number of clinical problems involving the temporomandibular joint (TMJ), masticatory muscles or both'. More recently, attention has been drawn towards

changing OVD. “Occlusion is the static relationship of the teeth and is basic to all aspects of dentistry” J.P.Okeson. This article will review the literature regarding the effect of altering the OVD on the health of TMJ.

➤ **EFFECT OF INCREASING VERTICAL DIMENSION:**

1. Clicking teeth/clattering of teeth: One of the early studies that investigated OVD was written by Christensen in 1970⁵. He increased the OVD in 20 healthy dentate patients and 22 complete denture patients by placing overlays on the mandibular molars for a period of 3–7 days. He reported that subjects developed several symptoms after increasing the OVD, but these symptoms were of mild intensity and more frequent in the group of dentate subjects compared to complete denture patients. The symptoms were initiated as early as one hour after the overlays were inserted and lasted on average 30 h. Clenching and grinding of teeth appeared in the first 36 h after insertion in both groups.

2. Increased masticatory muscle and TMJ pain. Although this was one of the first studies to evaluate symptoms associated with an increase of vertical dimension in the same study Christensen concluded that increasing the OVD resulted in an increased masticatory muscle and joint pain. In another study, *Dahl et al.* evaluated the effect of increasing the vertical dimension (range:2–8mm) by placing a partial chrome-cobalt splint covering the maxillary anterior teeth for 6–14 months in 20 patients with severe tooth attrition⁹. The use of a partial splint led to the intrusion of the anterior segment and extrusion of posterior teeth. Regarding the development of TMD signs and symptoms, the study reported that the splint caused short and transient discomfort.

3. Appearance: strained face has an **elongated** appearance since at rest the lips are parted and closing them together will produce an expression of strain.

4 Jaws are kept too far apart, Pain in TMJ: , Carlsson et al. investigated the effect of increasing vertical dimension (3-9 mm) by means of posterior acrylic appliances which provided good occlusal stability in 6 healthy patients with TMD signs or symptoms maintained for 7 days. The results demonstrated that subjects presented with moderate subjective symptoms⁵

Table 1. Various effects of altering Vertical dimension.⁴

<u>Excessive OVD</u>	<u>Insufficient OVD</u>
<ul style="list-style-type: none"> • Dentures less stable (like tall stool) • Large bulky 	<ul style="list-style-type: none"> • Dentures stable (short legged stool) • Small, less bulky dentures

dentures <ul style="list-style-type: none"> • Lower teeth show too much • No free way space • Teeth clatter • No room for food • Patient complains of tiredness • Jaws are kept too far apart Pain in TMJ • Appearance— Long face, strained • Pain and ulcer under lower denture • Teeth meet prematurely while elevators still contracting 	<ul style="list-style-type: none"> • Teeth not visible • Excessive Free-way space • Patient complaints are saying“can’t Eat” • Cheek biting • Tongue biting, discomfort and loose denture • Appearance— Short face,face Aged, sunken face • Exaggerated folds around the mouth • Angular cheilitis
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➤ **EFFECT OF DECREASING VERTICAL DIMENSION:**

1. Inefficiency: It is due to the fact that the pressure to be exerted with the teeth in contact decreases considerably with over closure because the muscles of mastication act from attachments, which have been brought close together.

2. Cheek biting: In some cases, there is losing of muscular tone, as a result of reduced vertical height, where the flabby cheek tends to become trapped between the teeth during mastication.

3. Appearance: The general effect of over closure on facial expression is increased with age. There is close approximation of nose to chin, the soft tissue sag and the lines on the face are deepened. The lips loose their fullness and the vermilion borders are reduced to approximately a line.

4. Angular cheilitis: A reduced vertical relation results in crease at the corners of the mouth beyond the vermilion border and the deep fold thus formed becomes bathed in saliva leading to infection and soreness.

5. Pain in TMJ: Trauma in the region of tempromandibular fossa may be attributed to a reduced vertical dimension with symptoms like obscure pains, discomfort, clicking sounds, headaches and neuralgia.

6. Costen’s syndrome: In 1934,Costen listed a number of symptoms that he believed were caused by over closure of mandible following loss of teeth .The symptoms associated with the syndrome were impaired hearing, stuffy sensation in the ear, impingement of auriculotemporal nerve and chorda tympani nerve causing pain and burning sensations in the throat, tongue and the sinuses.

CONCLUSION

The recording of jaw relations in the treatment of edentulous patients aims at facilitating the adaptation of the complete dentures to the masticatory system to give an optimal and comfortable function. To achieve this

goal, the recording must include an appropriate vertical dimension of occlusion and stable occlusal contacts in harmony with the TMJ, masticatory muscle functions and finally with the relationship between the prosthesis and the oral and the facial musculature.

Innumerable patients can not wear complete dentures then have continual difficulty in using them, principally because accurate vertical dimension of the natural dentition was not reproduced in complete dentures. Vertical dimension is in reality the most fundamental consideration in treatment planning.

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