Vertical Dimension of Occlusion

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Vertical dimension of occlusion (VDO) can be defined as the distance between 2 points, eg, the maxilla and mandible, when the teeth are in contact. An individual's VDO results from the conjoining of anatomic features and physiologic needs. Consequently, a series of complex events affected by craniofacial growth, neuromuscular control, and environmental factors converge to ultimately yield a patient's VDO. Whereas genetic potential, cell and tissue growth, and spatial ordering of the facial skeleton determine craniofacial growth, neuromuscular activity is determined by neural input that influences growth and development and sensory input from craniofacial muscles, bone, cartilage, soft tissues, and teeth. Unfortunately, although it seems intuitive that environmental factors have a significant effect on VDO, this concept has not received significant attention.

Vertical dimension of rest (VDR) may be defined as the distance between the maxilla and mandible when the mandible assumes a position of postural rest. VDR is influenced by many of the same factors that determine VDO. It is widely accepted that the VDR should be greater than the VDO to promote physiologic harmony. This distance is referred to as the interocclusal rest distance, or freeway space, and is reported to be 2 to 3 mm in the majority of patients. However, for VDR and VDO, a range of comfort exists that varies considerably between and within individuals, and both entities are influenced by biologic adaptability to normal functional demands and insults or injuries. Sensory information derived from craniofacial soft and hard tissues are fed to the central nervous system.

Clinically, terminology regarding altered states of vertical dimension focuses on the concepts of closure and sufficiency. Closure is a patient-based concept where a patient with suboptimal VDO would be "overclosed" or "open." In contrast, the concept of sufficiency relates specifically to the numeric measurement of VDO that defines suboptimal VDO as either "insufficient" or "excessive." Although "insufficient" and "overclosure" are used interchangeably by some, they are not synonymous (the same caveat applies to "excessive" and "open") since they represent distinct manifestations of nonideal VDO.

Insufficient VDO (overclosure) may be a consequence of tooth surface loss, most commonly attrition. The clinical consequences frequently proposed, not necessarily with enough clear objective evidence to confirm a direct relationship, are compromised esthetics resulting from changes in facial appearance, diminished masticatory function, angular cheilitis, altered phonetics, and adaptations within the temporomandibular joints. Excessive VDO (open) leads to encroachment of the interocclusal rest space, which may predispose to tooth contact during speech or when the mandible is in the postural rest position. However, patients may adapt to both of these circumstances. The clinical consequences frequently proposed, with the same paucity of corroboration, are compromised esthetics resulting from changes in facial appearance, diminished masticatory function, altered phonetics, and pain at the teeth or edentulous ridges. In addition, patients often describe a feeling of not having enough space in their mouth, a sensation akin to "oral claustrophobia."

Determining VDO is typically achieved using a combination of methods that employ subjective and objective measures. Subjective methods include determining VDR and positioning VDO to establish 2 to 3 mm of interocclusal rest space, phonetic assessment of the closest speaking space,¹ swallowing, and evaluation of facial esthetics. Objective methods typically utilize facial measurements and are based on the belief that initial VDO is similar to one or more specific dimensions, including some referred to as "divine proportions" by Leonardo da Vinci. A panel of potential initial VDO correlates includes the vertical distance from eyebrow to ala, horizontal distance between the pupils, and even the distance from eyebrow to hairline, to name a few. Clearly, these methods may not be appropriate for use in elderly patients, as the latter correlate, in particular, would portend some peculiar esthetic and functional outcomes given the prevalence of baldness in today's aging population!

Prudent clinical management requires sophistication to appreciate that VDO as a concept is far more important than VDO as an actual position in space. Clearly, for teaching purposes and indeed for clinical practice, compartmentalizing the stomatognathic mechanism into smaller fractions, such as VDR or VDO, offers the advantages of simplification. However, the astute clinician will recognize that the concepts of VDO and VDR must be placed in context as relatively minor, albeit integral, components of a complex craniofacial system.

Reference

 Silverman MM. The speaking method in measuring vertical dimension. J Prosthet Dent 1953;3:193–199. Copyright of International Journal of Prosthodontics is the property of Quintessence Publishing Company Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.