

## CHANGES IN THE VERTICAL DIMENSION OF OCCLUSION DURING DIFFERENT PERIODS OF COMPLETE DENTURE WEAR - a comparative study

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### SUMMARY:

The exact determination of vertical dimension of occlusion is of great significance for the recreation of the functional, esthetical and prophylactic biological factors for the edentulous patients.

Authors aim was to establish the change in mm of the vertical dimension of occlusion by patients with different duration of full dentures treatment.

Materials and methods: 75 patients (44 women and 31 men) aged from 56 to 82 years, wearing complete dentures for 3 to 10 years, were included in our investigation.

On all patients' plaster casts were made baseplates from photopolymerizing baseplates (TRIAD VLC Custom, Dentsply De Trey) and occlusal rims from temperature resisting pink wax (Modern Pink No3 Wax, Heraeus Kulzer, GmbH & Co. KG).

The numbers of measurements of the physiologic rest position for every patient were 10. After calculating the average value of measurements the result was minimized with 2.5 mm thus giving the vertical dimension of occlusion (VDO) for the new denture treatment.

Results and discussion: By 49 patients (65, 33%) the difference between the VDO with the old dentures and the new treatment was from 2 to 3.99 mm. By 17 patients (22, 67%) that difference was from 4-5.99 mm and by 9 patients (12%) - from 6-8 mm.

By all the patients the VDO had to be increased with 2-6 mm by the new treatment.

**Key words:** complete dentures, vertical dimension of occlusion, physiologic rest position

### INTRODUCTION:

After complete loss of teeth the basic characteristics of occlusion are lost. Clinician faces the difficult appointment of establishing the parameters of occlusion, where the position and character of movements of the lower jaw (LJ) are changed. [1,2,3] Determination of the vertical dimension of occlusion (VDO) is a subjective

process, difficult enough because of the different psychic condition of the patient on one hand and on the other hand the mobility of landmarks which are placed on soft and movable tissues. There are also some other factors which render difficult this appointment such as: severe atrophy of the jaw bones (JB), xerostomy, lowered neuromuscular tonus, the skill of the clinician etc.

### PRESENTATION:

There is no precise scientific method for determining the correct edentulous occlusal vertical dimension. [3, 4, 5] The accurate determination of the vertical dimension of occlusion (VDO) affects not only the chewing suitability of the dentures but also the aesthetical view and the correct manner of speaking and pronunciation of the patient. [6,7]

Some authors point out the difficulty of this process even by young and healthy people and indicate the great individual differences by patients, especially by those with advanced age and severe atrophy of JB. [2, 6, 8,9]

The great majority of authors states that the difference between the physiologic rest position (PRP) of the jaws and the position of jaws in occlusion (VDO) is about 2-4 mm (i.e. 2-4 mm is the distance between the occlusal wax rims or artificial teeth of both jaws at rest). [2, 6, 8, 10]

That preferred distance is changing through the years of wearing dentures affected by the atrophy of JB. The vertical dimension of occlusion is changed because of the wear of artificial teeth also. Both these changes lead to alteration of the position of LJ forwards and upwards in order to achieve contact between the teeth. Such patients may have a progenic look. The lost of the appropriate VDO may result in an edge-to-edge position of the incisors and in more severe cases to cross bite (progenic occlusion) in the frontal teeth. Usually it takes years for such deep changes and usually it happens without any symptoms.

The **aim** of this study is to establish the change in mm of the vertical dimension of occlusion by patients with different duration of full dentures treatment.



**Fig. 1.** A prognathic view of a patient with lowered vertical dimension of occlusion and a six years old complete dentures treatment.

**Fig. 2.** The same patient with restored vertical dimension of occlusion and improved aesthetical view with the new dentures.

**Fig. 3.** Unsupported and folded upper lip because of improper position of the wax rim.

**Fig. 4.** Correct position of the upper lip by the same patient after adding wax vestibular to the wax rim.

#### MATERIAL AND METHODS.

75 patients aged from 56 to 82 years, average age 69 years, treated with complete dentures were included in our investigation. From them 44 were women and 31 were men with old dentures aged from 3-10 years. A new forthcoming treatment was to be performed to them. All the patients were edentulous more than 4 years. The included patients have approximately second stage of bone resorption by Kurlyandski classification. A comparison between the measurement of the vertical dimension of occlusion (VDO) with the old dentures and the new treatment measurement is made. Custom tray impressions with irreversible hydrocolloid impression material were taken from every patient. The individual trays were made from photopolymerizing baseplates. The adjustment of the individual trays was made very carefully, so not to extend the borders of the tray over movable tissues. The impression technique used was registration of peripheral border seal with Xantopren H and a subsequent wash impression with Xantopren L. On all the patients' plaster casts were made baseplates from photopolymerizing baseplates (TRIAD VLC Custom, Dentsply De Trey) and occlusal rims with temperature resisting pink wax (Modern Pink No3 Wax, Heraeus Kulzer, GmbH&Co.KG). For the precise determination of the VDO a stable position of the baseplates was needed which we achieved with the help of very small amount of "Corega" denture adhesive (Glaxo-Smith-Kline) and accurate adjustment of the borders of the baseplates. Special attention was paid on the position of the frontal part of the wax rim in connection with the proper lips' support. Corrections were made until an acceptable aesthetic position of the lips both for the patient and the clinician was achieved. /Fig.3,4/

Measurement of anatomic landmarks of the face has been considered as a method of recording occlusal vertical dimension [1, 3, 7].

The main two referent points we used for the measurements were Gnation and Subnasale, which were marked with the help of sharp dermatographic pencil. It is a method quite accurate and reliable and needs only a caliper and a ruler.

Every patient was instructed to moisture the lips with the tongue, to open wide the mouth then to close slowly until the first gentle touch of the lips was achieved- i.e. the physiologic rest position of the mouth. The closing of the mouth should be performed without any tension in the muscles and stopped at the first contact of the lips. A mirror was given to the patient and he/she was asked to repeat those movements several times under the supervision of the clinician. It is important the patient to sit bolt upright and at same time relaxed in the chair so the occlusal plane to be parallel to the floor and to the sight of the clinician. The measurements were made with the help of a clinical caliper. The numbers of the measurements of the physiologic rest position for every patient were 10. After calculating the average value of the measurements the result was minimized with 2.5 mm thus giving the VDO for the new treatment. Fig. 5 and Fig. 6. At the end of the procedure the patient was asked to put his old dentures and the VDO was measured again. The results between the new treatment values and the old treatment ones were compared and analyzed.



**Fig. 5.** Determination the physiologic rest position of the lower jaw of a patient with a clinical caliper.



**Fig. 6.** Diminution the value of the physiologic rest position with 2.5 mm to establish the VDO.



fig. 7



fig. 8

**Fig. 7.** Checking up on the space of 2.5 mm between the wax rims at physiologic rest position of LJ.

**Fig. 8.** Checking up on the space of 2.5 mm between the artificial teeth at the trial appointment.

## RESULTS AND DISCUSSION:

The results are shown in table 1. It is seen there that by 49 patients (65, 33%) with old denture treatment duration between 3-6 years the difference between the VDO with the old dentures and the new treatment was from 2 to 3.99 mm. By 17 patients (22, 67%) that difference was even greater: from 4 to 5.99 mm, but the duration period of the old treatment by those patients was between 4-8 years. The greatest value of difference of VDO was found by 9 patients (12%) - from 6 to 8 mm. The dentures' age by that group was from 5 to over 10 years.

By all the patients the VDO had to be increased with 2-6 mm by the new treatment, which shows that even at three year period of wearing dentures, changes of VDO had occurred by some patients.

The clinician should inform the patient that a pair of dentures should be used approximately 4-5 years no matter that he /she has no complaints, because the changes advance inevitably and imperceptibly as in the anatomic substructure of the prosthetic area (i.e. the atrophy of the JB) as well in the dentures itself.

The precise determination of VDO should be estimated with great attention especially in the cases with implant supported full dentures, as the success of the final result is closely connected with the true VDO and because of the high cost of that treatment.

## CONCLUSIONS:

Changes in VDO by patients with complete denture treatment is due mainly to the resorption of the residual alveolar ridges and to the wear of the occlusal surfaces of the artificial teeth. The continuous use of such dentures could result in shortening of the lower third of the face which makes the patient look older and leads afterward to hypertonus of the muscles and to changes and complaints in the TMJ. In case of a new treatment the establishment of the VDO should be done precisely and independently from the previous treatment.

The clinician should also ask the patient to come once a year at a check up appointment so to observe the condition of the denture bearing tissues and to check the changes of VDO.

**Tabl. 1.** Distribution of patients by gender, duration of treatment and difference in VDO

N	Difference in VDO	Number of patients	Percent	Women	Men	Duration of old treatment
1	Difference in VDO from 2 to 3.99 mm (mean value 2.99 mm)	49	65,33%	28 (57, 14%)	21 (42, 86%)	From 3-6 years
2	Difference in VDO from 4 to 5.99 mm (mean value 3.99 mm)	17	22,67%	11 (64, 71%)	6 (35, 29%)	From 4 to 8 years
3	Difference in VDO from 6-8 mm (mean value 7 mm)	9	12%	5 (55, 56%)	4 (44, 44%)	From 5 to 10 years
	Total numbers of patients	75	100%	44 (58, 67%)	31 (41, 33%)	

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