



The means of determining the Vertical Occlusion Dimension

A. MOUHIBI, A. CHAFII, A. ANDOH

Department of fixed Prosthodontic, University Hassan II Casablanca Morocco

I. Introduction

The vertical dimension is defined as "the distance between two selected anatomical or marked points (generally one on the tip of the nose and the other on the chin), one on a fixed member and the other on a mobile member (Glossary of terms used in prosthodontics, 2005). The vertical dimension is established in occlusion (DVO) and at rest (VDR). In occlusion, it is when the teeth are in intercubitation (IC). During life, changes in dentition can lead to changes in VDO (missing or incorrectly positioned teeth) and, generally, these changes cause some loss in VDO. It is therefore an accepted standard, during the manufacture of removable or fixed complete prostheses or during the rehabilitation of a partially edentulous individual with severe tooth positions, that one of the first stages of patient rehabilitation is "Establishing a correct DVO. Different methods and techniques have been suggested to restore the original DVO or define a treatment.^{1,2,3} The purpose of this literature review is to summarize the methods and techniques studied from the early 1950s to the present, applicable to dentate and toothless patients.

II. Méthodologie

This literature review evaluated and compared studies on techniques for establishing DVO in dentate and toothless patients. A search in PubMed databases was performed and limited to articles in English published between 1951 and 2018 using the words meshes VDO, prosthodontic, determination.

All references in selected articles have been filtered for additional publications. Among the articles included, classical studies on the determination of VDO using the methods of pre-existing recordings or prostheses, phonetics, aesthetics, physiological rest position, swallowing, various craniometric measurements, radiographic images and neuromuscular records were selected.

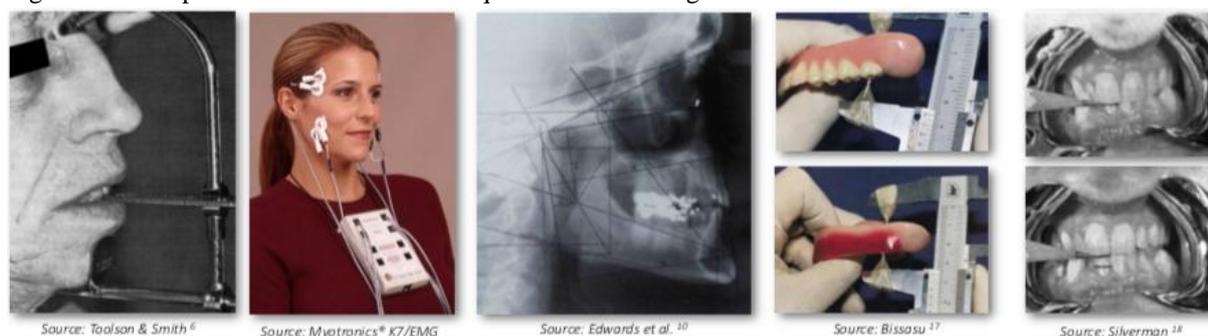
III. Results and discussion

A summary with a description, advantages and disadvantages of the techniques is presented in Table 1. Due to certain technical limitations, it is suggested to use a combination with other methods to complete the assessment of DVO. Most of the techniques are applicable clinically, with the exception of neuromuscular and radiographic techniques, which require additional equipment. Craniometric techniques are still offered until today. In addition, devices to better establish the rest position, such as that proposed by Makzoumé, were proposed this year.

Technic	Description	Advantage	Disadvantages
Use of old dentures ^{4,5}	<ul style="list-style-type: none"> Evaluation of old diagnostic models Photographs pre-existing prostheses 	Defines a basic record	Old diagnoses may be inaccessible Photographs had to be taken before Preexisting prosthetic teeth may be worn or have inadequate DVO
Phonetic ^{6,7}	Sound S to measure whistling space <ul style="list-style-type: none"> Its F to locate the incisal edges of the maxillary teeth Sound M to locate the mandible in the rest position 	Reproducible Indicates position of incisors Relationship of the lower lip with the incisors	Variable results for patients with class II and III malocclusions More efficient for the production of full dentures
Esthetic ^{8,9,10}	Harmonious aesthetics of the lower floor of the face compared to the other floors	Reproducible Simple Applicable on young subject with good muscle tone	Patients with poor skin tone The absorbed ridges with prostheses prevent any restoration of the lip contour "Breathing" patients Patients with varying degrees of incompetence lip morphology
Physiological rest position ^{11,12}	Mandibular position at rest	Ensures the recovery of the incisors	Minor muscle tension will result in inaccurate measurements <ul style="list-style-type: none"> Recommended combination with other methods
Swallowing ^{13,14}	Mandibular position involves acceptance of DVO and centered relationship	Reproducible for dentate and toothless patients	Recommended combination with other methods
Cranial measure Craniometric ^{10,15}	Use of facial cranio measurement	Simple technique Applicable in clinic Non-invasive method	Recommended combination with other methods
Radiographic ^{16,14,17}	Cephalometric measurement of the mandibular position relative to the facial craniofacial	Very common and reproducible Indicates the relationship of the incisors	Indicates an incisive dental relationship <ul style="list-style-type: none"> Controlled adjustment is mandatory. Additional equipment. Irradiation

Neuromuscular ^{18,19,20,21,22}	Electromyographic recording of muscle activity with minimal activity in the rest position.	Important tool in clinic and research Reproducible expensive	Devices rarely available in clinical settings • Experience required • Sensitive technique from precise control adjustment is mandatory
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Figure 1: Description of the different techniques for determining the VDO



IV. Conclusion

Overall, there is no universally accepted or perfectly precise method. To determine the VDO, the use of a combination of techniques is the most suitable method to date. More studies on craniometric techniques are needed, using anatomical landmarks that do not vary over the course of human life. In particular, there is a need for studies comparing the accuracy and reproducibility of several methods in dentate and toothless patients.

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