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RECORDING MASTICATION ANGLES BY PLANAS'S LAWS

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Abstract

Introduction: Planas's fundamental laws are based on the neuro-occlusal concept, which plays a major role in the development and evolution of the stomatognatic system. The alterations of the masticatory functions contribute to the modeling of the structures that form the stomatognatic system.
Methodology: The purpose of the study was to assess the masticatory stereotype of a group of young people and to analyse the functional masticatory angles.
We have assessed the amplitude of the functional masticatory angles on a group of 20 students. The masticatory angles depend on the occlusal morphology (cusp size), age and masticatory movements.
Results: Great alterations are present with patients with dento-maxillary anomalies, edentations, dental injuries and unilateral mastication.
Conclusion: The data obtained allow us to improve the masticatory functions as part of a complex oral rehabilitation. The functional masticatory angles are asymmetric on a majority of cases.

Keyword: Planas's laws; modeling of the stomatognatic system; evaluation of the functional masticatory angles.

INTRODUCTION

When we speak about mastication analysis, we usually refer to the mastication stereotype, without concrete data. These data, based on clinical research, should be clearly presented to the patient or patient`s parents in order to explain the treatment needs to them

Planas [1] processed a basic and simple analysis of the masticatory angles based on a series of clinical observations. He noticed that functionally insufficient mastication causes a series of alterations of the alveolar bone, the mucosa and dento-periodontal components, with specific repercussions on all the components of the stomatognatic system. He also observed during the clinical studies that neuro-occlusal rehabilitation is achieved only by stimulating a correct masticatory function, which is essential for the neutral morphology of the stomatognatic system .

Planas studied and described the physiology of the masticatory function providing us with methods for an adequate treatment. They are defined as Planas' development laws (the law of antero-posterior and transversal development, the vertical development of premolars and molars, the vertical development of incisors and the development of the occlusal plan) which make possible the evaluation of the consequences and adaptive mechanisms of the elements making up the stomatognatic system, as a consequence of mastication.

The functional angles of mastication guide orthodontists to expand the study of their patients' stomatognatic system.

The neuro-occlusal rehabilitation is based on the conclusion that the the masticatory function plays a major role in the optimal development and evolution of organs and structures (alveolar bone, periodontium, muscles, and temporomandibular joint and teeth position on the dental arch), that make up the stomatognatic system. Therefore, it becomes an imperative to know the masticator stereotype and equalize the masticatory angles for correct oral rehabilitation.

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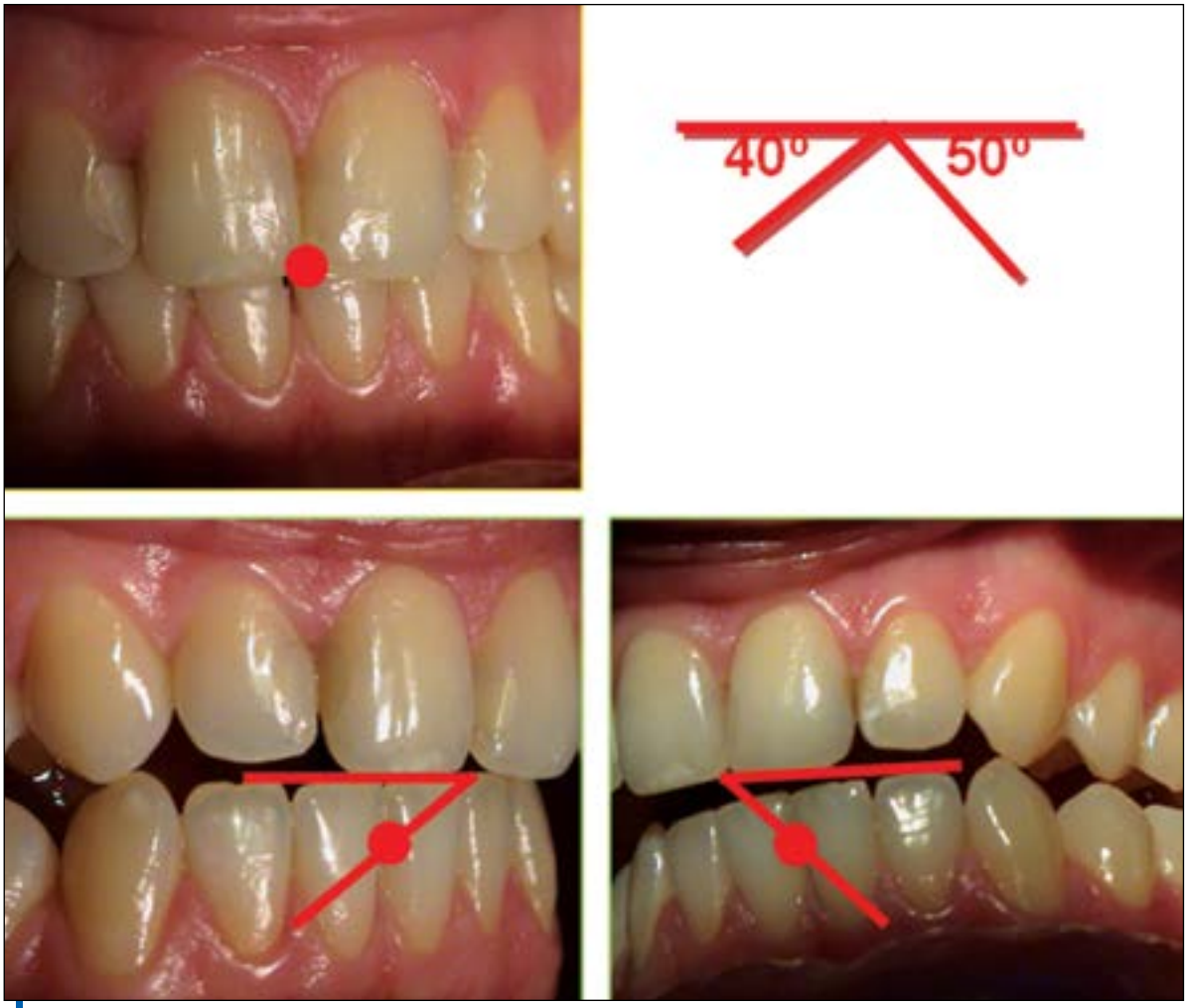

Figure 1. Masticatory angles on patients with the vertical masticatory stereotype

MATERIAL AND METHOD

The analysis of the masticatory function has been performed on one group of 20 students from the University School of Dentistry – Timisoara. Given the large number of techniques used for the determination of the functional masticatory angles, we chose the one proposed by Planas, because it is the most practical and simple.

Here are the steps of the clinical procedure:

The patients' teeth are in close contact, in maximal intercuspation. The dentist uses tweezers in order to locate the reference point. The reference point is situated on the junction of the lower incisors medial line and the free edge line of the upper incisors. This point will be marked with a waterproof marker. From the occlusal maximal intercuspation, the mandible glides laterally left and right, (maintaining partial teeth contact), until an edge to edge or canine cusp to canine cusp (when the guidance is antero-lateral, canine) position is obtained. The trajectory of the reference point will be carefully observed during lateropulsion, highlighting any deviations from the trajectory caused by interferences.

The digital images of the masticatory angles, relevant to pathological aspects, allow us to determine the values of the angles on the computer.

When differences between the two angle values (left and right) appear, the patient will prefer to masticate on the side where the value of the angle is smaller.

RESULTS

After analysing the masticatory angles (left, right) on a group of 20 students, we have concluded:

Different values of the left and right angles appear with a majority of patients, irrespective of the masticatory stereotype. These are the consequences of unresolved problems in oral rehabilitation.

67% of group under research evince the vertical masticatory stereotype, which means that the mandible moves rather in the frontal plane and less laterality (38% are symmetric and 62% are asymmetric).

33% of group under research evince the horizontal masticatory stereotype with

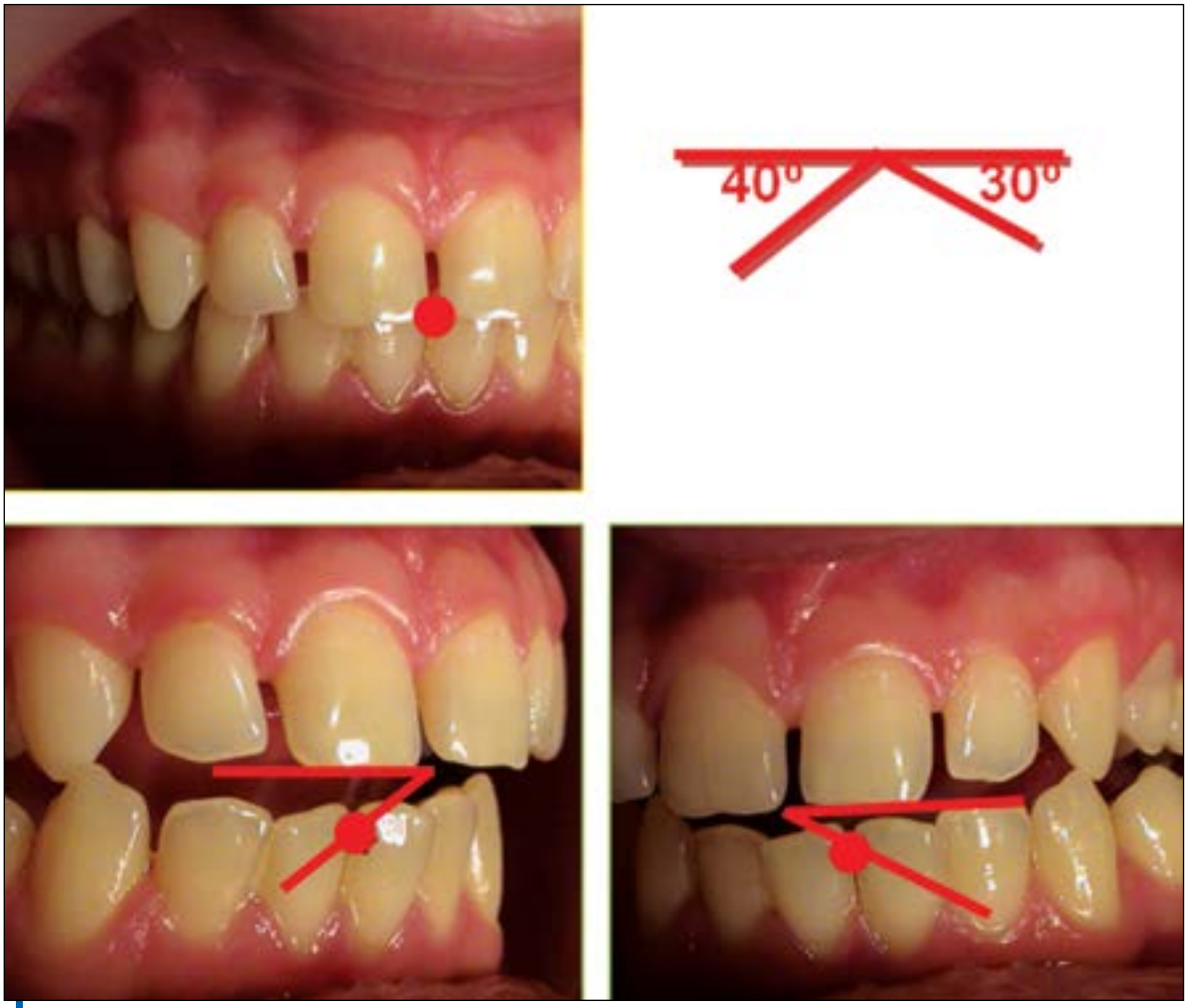

Figure 2. Masticatory angles on patients with the horizontal masticatory stereotype

intermediary aspects, where the masticatory angles are symmetric only in 32% of cases and asymmetric in 68% of cases.

Although the trajectory can vary significantly, the start and stop positions of the mandible always match one another. Therefore we must underline the fact that terminal phase is guided by the dental articular surfaces, starting from the first dental contact until the maximal intercuspation is realized. This position corresponds to the minimal vertical dimension, therefore interferences can be palpatorily detected.

The assessment and comparison of the values of the two angles provide us with useful information about how our patients perform the basic function of the stomatognatic system, namely mastication.

The data obtained reveal a remarkable fact, namely that 93% of the cases present modification of the masticatory function. Figure 1. and 2. show us the differences between the two masticatory angles on two types of patients, one with a vertical masticatory stereotype and the other one with a horizontal masticatory stereotype.

Patients present problems, such as: unresolved dento-maxillar anomalies in their childhood or adolescence, edentulous without prostheses, odontal, periodontal and prosthetic defective treatments (defective reconstruction of dental morphology), etc. Such problems create at least partial masticatory insufficiencies which have long term consequences.

We think that the existence of a large number of patients with the vertical masticator stereotype in their young ages is a result of the eating habits (fast food – hamburgers, which is not stimulating enough). On the other hand, some ethnic groups of the Banat population raise the question of a genetic determinant in this area.

DISCUSSION

For the neuro-oclusal rehabilitation it is essential to analyse the functional masticator angles. This analysis should be done for all patients because it provides us with most of the information about their masticatory function.

Planas's philosophy starts with the mandible bone development and it is in close correlation with the dynamics of temporomandibular joint.

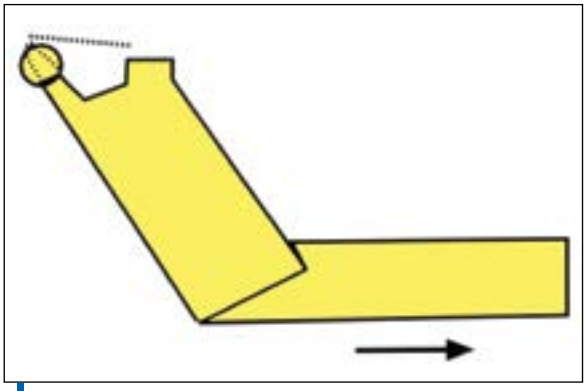

Figure 3. The antero-posterior growth is the movement of mandible to the non-working side

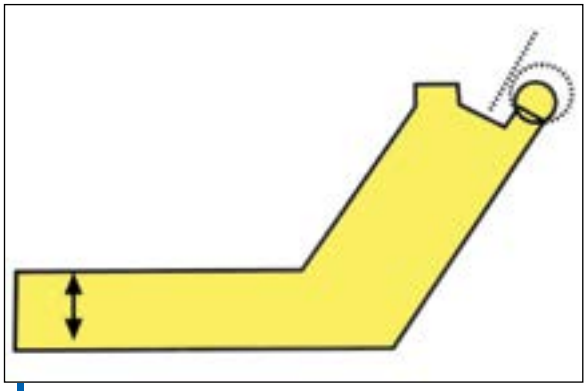

Figure 4. The gliding of the mandible to the working side causes transversal development

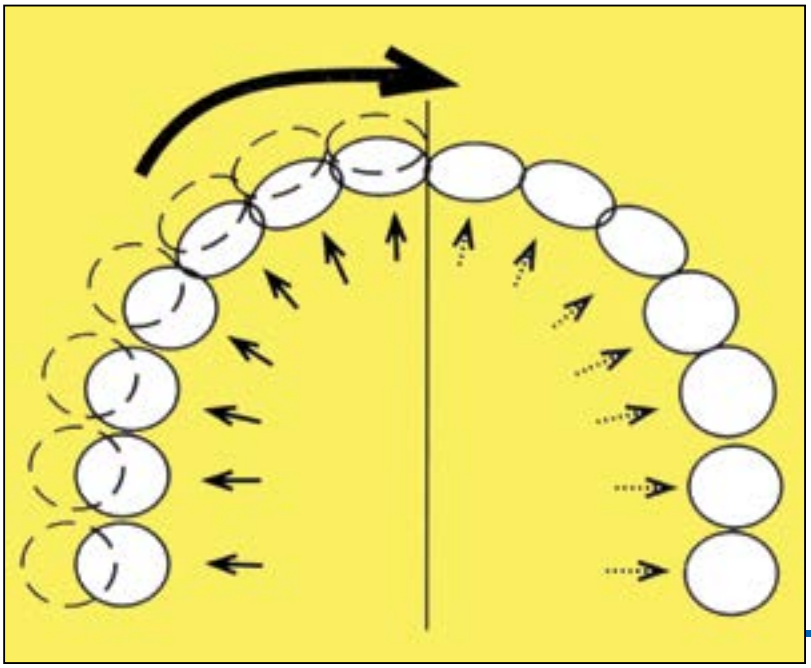

Figure 5. Growth or expansion of the maxilla

The gliding of the mandibular condyle and articular disc complex [2] during the diagono - transverse movement is the stimulant need for growth. What is essential for the mandible antero-posterior growth is the movement of the mandible to the non-working side (fig 3).

The gliding of the mandible to the working side causes transversal development (fig 4.) determined by muscular contraction and occlusal contacts during mastication (the stimulants are perceived and transmitted thanks to a rich periodontal innervation).

Petrovic's [13] observations after sectioning the pterygoid muscle (on rats), certify that the mandible undergoes a "decrease in longitudinal development and a drop in the number of mitoses in the growth area".

The growth of the mandible is obtained using a system that amplifies the propulsion of the mandible. In conclusion, immobilizing or limiting the movements of the mandible can induce a significant diminution of the mandible size and the diminution of the mitoses number [3].

Maxillary growth, according to Planas[14, 15], depends on the friction force that appears in mastication between the dental articular facets of the superior and inferior teeth on the working side [10-15]. The result will be the growth or expansion of the maxilla in that zone together with the palatal vault and the floor of the nasal fossae (fig. 5).

Thus, a circle is created in which the growth of the mandible determines the growth of the maxilla. To have physiological masticatory movements, we need to cause the diagono-transverse movements of the hemi-mandible to the non-working side and sufficiently intense dental contacts on the working side.

Murphy [1] explained that the masticatory cycle evinces overlapping of the terminal points, irrespective of the mandible trajectory, which we have also underlined.

In order to consider the masticatory function correct, it is necessary that the masticatory angles permit not only an easy lateral movement of the mandible, but also equal dental contacts.

Ferrer and Bourdoil [10, 11] noticed that, with most patients, when opening the mouth, the mandible first moves to the non-working side and after that to the working side. We have found that the mandible first moves to the working side in 60% and to the non-working side in 40% of the patients examined.

Peraire [4] found that in 41% of the cases the mandible moves first to the non-working side.

We can say that a masticatory angle of a high value is always pathologic because it produces vertical masticatory movements with less laterality components, therefore little capacity for pressure and friction on the dental arches.

One can tactilely perceive the dependence of the occlusal morphology on situations when the point of the functional angles evinces interferences on the working or the non-working side [5], which triggers the deviation of the mandible trajectory, making it curve or in bayonet.

The masticatory stereotype is in direct relation with the oro-facial disorders [6][7][8][9].

CONCLUSIONS

Oral rehabilitation without accurate knowledge of the possibility to influence the stomatognatic system structures is a big mistake. Registration of the masticatory angles is easy to do in any dental office. Our results demonstrate that on the experimental group, 60% of the patients have the vertical masticator stereotype.

Functional masticatory angles are asymmetric in most cases (67% evince the vertical masticator stereotype and 75% the horizontal masticator stereotype).

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