DENTAL OCCLUSION AND THE IMPORTANCE OF ITS PROPER INVESTIGATION – PART II
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ABSTRACT
The traumatic occlusion is the main factor inducing the dysfunctional syndrome, thus an important goal in dentistry is to identify as soon as possible the deviations from normal occlusion. The purpose of the paper is to offer an useful instrument to achieve the proper knowledge of clinical evaluation of dental occlusion as a first condition required by a correct diagnosis and treatment planning. Our original method of examination comprises a logical and easy sequence of steps. The first two of them were presented in a previous paper, the current one continuing with the static and dynamic occlusion examination.

The clinical examination of the dental occlusion involves an increased knowledge, power of discernment for sorting the collected data and experience in the correct analysis, to formulate a complete and competent diagnosis of the occlusal integrity. The technique itself comprises multiple stages that need to be accomplished in order to obtain an appropriate occlusal status that is needed to guide the diagnosis and the treatment plan.

The first stages of our original clinical examination method were described in the previous issue. The next stages will complete the method, allowing the correct evaluation of the occlusion.

STAGE III – The analysis of the inter-arch relationships
The static reports between the two arches in contact, in maximum intercuspatation as well as in centric relation, are analysed in the three directions of the space. Normally, the difference between the two positions is very small (0.2-1.7 mm), but there may be situations when significantly different values are found in patients with important systemic dysfunctions.

Thus, in the sagittal plane, at the level of the molar, premolar and canine, mesialized or distalized reports can be found, and at the incisive level, the values of the overjet may be increased (over 2 mm), situation called increased/positive overjet, or diminished (under 0 mm) - reversed/negative overjet or anterior cross bite, or even anterior scissors-bite; any change at this level disturbs the previous guide and the protrusion movement. Normally, the overjet is from 0 (edge to edge bite) to 2 mm.

In the transversal plane (horizontal), at the molar, premolar and canine level, the landmarks may be placed buccal or lingual, the most common being posterior scissors-bite, cusp to cusp occlusions, reversed occlusion or cross-bite (unilateral or bilateral). At the incisive level, from a pathological point of view, right or left lateral deviations of the lower midline may be found.
In the frontal plane (vertical), at the canine, premolar and molar level, we may encounter situations of supra- or infraocclusion, and frontal overbite that is not between 0 and 1/3 of the buccal height of the mandibular incisors. Thus, we can deal with a deep bite (incomplete deep overbite or complete deep overbite) or with an open bite.

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<tr>
<th>Plan</th>
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*Table 1. The inter-arch relationships table*

The analysis of the inter-arch reports must end with a series of conclusions. These refer only to the pathologic, abnormal, and their role is to synthesize, in a simple manner, all the existing disorders.

**STAGE IV - The analysis of the dynamic occlusion**

1. **The examination of the dento-dental contacts in retrusion**

Starting from the maximum intercuspation position, the mandible can run a distal movement, maintaining the dento-dental contacts. This is the retrusion movement and it represents the trajectory between maximum intercuspation and centric relation, with dental contact. This mandibular trajectory can often be disrupted through secondary occlusal obstacles and dental migrations, inclinations, prosthetic reconstructions. These obstacles can cause muscle spasms which, generally, prevent the obstacles to be revealed. In most cases, it takes a muscular relaxation to search the right centric relation and to investigate the retrusion movement.

The sliding of the mandible from centric relation to maximum intercuspation must be done harmoniously and continuously. Before analysing the retrusion movement, it is necessary to investigate the centric relation.

The mandibular retrusion analysing technique also includes several steps:

1.1. **Inducing muscular relaxation**

The patient should be able to perform the retrusion movement naturally, with the muscular decontraction. A hypertonia of the muscles of mastication or a joint pain may oppose to the motion and may make the investigation of this movement impossible.

In such cases, an occlusal tray, with or without a drug treatment, that cancels the abnormal positioning reflexes and that participates in muscular relaxation may be useful.

1.2. **Determining the Centric Relation**

The determination of the centric relation will be carried out following one of the existing techniques, providing relaxation conditions and inducing the patient to become “occluso-conscious”.

The patient will be asked to indicate the place of first dento-dental impact/contact, subsequently visualizing the centric occlusal contacts with articulating paper. The manoeuvre is resumed several times, until the patient will be able to reproduce the movement correctly.

1.3. **Marking the premature contact**

a. First, the contacts in maximum intercuspation are marked because it is important to identify the stabilizing points in order to preserve them.

b. The articulating paper is placed on the right and left premolar-molar occlusal surfaces.

c. The first contacts are marked in the centric relation position.

d. The patient is asked to clench his/her teeth, starting from the premature contact. The mandibular movement up to the maximum intercuspation must be noted effectively; this sliding can be forward or anterolateral.
2. The examination of the occlusal contacts in propulsion

Propulsion is the functional movement that the mandible performs when the edges of the mandibular incisors slides on the palatal aspects of the maxillary incisors from the maximum intercuspation position to the “edge to edge” active test position. The surface between the points of occlusal stability and the free edges of the maxillary incisors is called incisive or anterior guide.

2.1. Features of the incisive guide

- The morphological component of the incisive guide is represented by the palatal aspects of the maxillary central incisors and, sometimes, of the maxillary lateral ones, from the maximum intercuspation contact points to the free edge of incisors.
- The incisive guide must allow the total immediate disocclusion of the posterior teeth.
- The incisive guide and the lateral disocclusion are directly related to the existing over-bite and over-jet.
- The anterior guidance must lead the mandible in propulsion following a straight trajectory in the medio-sagittal plane.

All dental obstacles that prevent the harmonious sliding of the mandible in propulsion are called interferences.

The protrusive working interferences are situated on the level of the incisors that execute the anterior guide. If a single tooth takes over the movement of propulsion, it constitutes an obstacle that can cause a mandibular lateral deviation. The teeth that support such forces suffer an occlusal trauma. The incisor might migrate toward vestibule and, it may be followed by an antagonist that moves vertically or that migrates toward lingual.

The occlusal trauma can also aggravate the existing periodontal disease.

During the propulsion, it is desirable to achieve the total and immediate disocclusion of the posterior teeth. However, there are some authors who claim that a combined guide at the level of both incisors and posterior teeth should exist in the initial stage of the propulsion. If these contacts exist and if the movement is harmonious, the situation is considered normal. If the sliding of the mandible is interrupted by a posterior obstacle, they say that it is a non-working protrusive interference that must be corrected because it has a huge pathogen potential.

2.2. The propulsion examination technique

Observation of the propulsion (the examination of the actual movement)

The patient is asked to perform the advancement of the mandible, keeping the dento-dental contact until the “edge to edge” active test position. The movement is rarely executed correctly the first time (the contact is not maintained, and the movement is too fast). If a lateral deviation is noticed, the practitioner seeks to obtain a rectilinear movement and to mark the interference. The patient must repeat the movement several times.

Searching for a protrusive working interference

In the first stage, the stable contact points from the maximum intercuspation, at the incisor-canine level, must be found and marked with articulating paper.

Then, the patient is asked to perform the propulsion with the mandible centred in a medio-sagittal position, and the incisive trajectory is recorded. The recording will highlight the tooth that supports the movement singularly. The next step is the notation of the occlusal scheme.

Searching for a protrusive non-working interference

The contact points in maximum intercuspation, this time at the level of the posterior teeth, must be also marked. The occlusal markers are introduced along the arch and the patient is asked to perform the propulsion in centered medial-sagittal position, to the test position. Any existing contact in the distal region is noted on the occlusal scheme.

3. The examination of the occlusal contacts in laterality

It is one of the most important stages in examining the dynamic occlusion as the
interference in the lateral movement is the most common cause of the dysfunctional syndrome.

The movement of laterality is the trajectory followed by the mandible when the mandibular teeth slide on the internal slopes of the guiding maxillary cusps and/or on the palatal side of the maxillary canine. These areas are called **guiding surfaces** and they include:

- the palatal aspect of the canine from the supporting point (the contact from maximum intercuspation) to its cusp tip
- the internal slopes of the maxillary buccal cusps from the supporting point (maximum intercuspation) to the cusps tips.

When the mandible is moving laterally, there is a working side (active) and a non-working (inactive). Thus, if the mandible moves to the right, the right side is the working one (the mandibular vestibular cusps slide on the vestibular cusps of the maxillary teeth). On the left, the cusps must not be in contact and this is the non-working side.

3.1. The examination of the working side

The guidance of the movement of laterality with dental contact can be carried out through canine or group function.

The canine function

Starting from the maximum intercuspation position, the patient laterally slides his/her mandibular teeth on the maxillary teeth, keeping the dental contact until the “tip to tip” active test position.

If the maxillary canine alone leads this movement, a canine function is present in the patient, during the whole trajectory. Right from the start and throughout the entire trajectory, the disocclusion of all other teeth must be immediate and total. The maxillary canine possesses a strong periodontium, adapted to perform this function. The canine function is frequent and it can be considered ideal.

In order to be achieved, the canine function must meet certain requirements:

- the maxillary canine must be in distal position with “half of tooth” relative to the mandibular canine (Class I Angle)
- there must be a stable contact in maximum intercuspation on the palatal aspect of the maxillary canine in order for the canines to participate in a movement, right from its start
- there must be a canine over-covering, bigger than the one at the level of the molars and the premolars
- a minimum canine over-jet must exist (in any case, inferior to the one from the incisor level)

The group function

If on the working side more teeth (premolars, first molar), including the canines, guide the movement of laterality starting from maximum intercuspation and going to the “tip to tip” active test position, we are in the presence of a group function.

The group function is believed to provide a good periodontal protection. The occlusal forces are distributed over all teeth, ensuring an immediate and total disocclusion of the non-working side.

In practice, the group function is hard to balance, because simultaneous dental contacts of equal force must be obtained on each lateral tooth that participates in the group function.

3.2. Examination of the movement of laterality technique

A. The observation of the movement of laterality

Often, it is difficult for the patients to perform the movement of laterality on the desired part. There may be some kind of blockage or muscle contraction that increases the difficulty of the examination.

We ask the patient to slide his/her mandibular teeth on the maxillary ones, keeping contact. To give the patients a sense of movement, we can place a finger on the maxillary canine towards which we want them to execute the movement. The movement should be repeated several times, on the right and then on the left.

When the movement has become easier to perform, we can search for the interferences. First, we mark the initial
points from maximum intercuspation then, with the marking on the working side, we record the movement.

B. Searching for a working interference

Recording the lateral function starting from maximum intercuspation allows highlighting the teeth that support this function.

If by using the articulating paper a more pronounced marking appears on any other dental surface except the canine, we have a working interference.

In the presence of a group function, we will also check if there are minor dental displacements caused by the lateral forces, with the index placed on the vestibular side of each tooth involved in the movement.

Then, we try to reproduce the movement of laterality starting from the centric relation/occlusion. Obstacles, if any, can be situated towards the lateral sides of the arch.

The last stage is checking any anterior interference in the movement of laterality.

The distribution of the forces between the teeth of interest during the wide movement of laterality, but also during the small movements, must be examined. The working interferences are noted in the sheet with the occlusal scheme.

C. Search of nonworking interference

An absence of a contact or an interrupted contact on the working side must lead us towards a non-working interference.

First, we will examine the non-working wear surfaces from the distal internal slopes of the maxillary palatal cusps.

We will place the fingertip on the vestibular side of each maxillary molar and premolar from the non-working side, to detect an increased mobility during the movement of laterality on the opposite side.

After making the contact points in maximum intercuspation with the articulating paper applied on the non-working side, we ask the patient to execute the movement of laterality.

We have to take into account the fact that, usually, in laterality, the non-working interferences cause a muscular coordination disorder: the patient avoids this kind of interference in his/her habitual movements of laterality, which makes the analysis difficult. In these cases, the analysis on the articulator facilitates the examination and provides the safety of the examiner.

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