CORRELATIONS BETWEEN OCCLUSION PRESURE AND MUSCLE ACTIVITY WITH K7 SYSTEM

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Abstract: trying to measure the occlusal pressure always represented a challenge for researchers, the methods used were various from simple to complex ones. It is very important to be able to appreciate the forces born at the occlusal level through both diagnose and treatment point of view, knowing that every dental treatment (filling till complex rehabilitation) needs excessive attention in occlusion relationship reconstruction.

This was the main purpose of our study concerning forces developed in occlusion and their distribution. The utility of research is evident in occlusion rebalancing treatment.

Key words: occlusion pressure, evidence based dentistry, K7 system

INTRODUCTION

A correct maintained or rehabilitated occlusion needs more than multiple, stable, uniformly distributed static and dynamic contacts, it also needs a harmonious and symmetrical transmission of forces produced by mandible muscles.

This was the starting point for our study concerning the pressure born at the occlusal level, and their distribution to the dental level; the utility of our research earn in the possibility of obtaining a perfect occlusion equilibration, based on scientific evidences.

MATHERIAL AND METHOD

The present study was based on a lot of 34 patients with ages between 22 and 27 years old, 19 male and 15 female, with complete dental arches or unidental edentulism, stable occlusion (more than 100 centric stops), static and dynamic fundamental relationships with clinical correct parameters.

They were examined first clinically insisting on static and dynamic occlusion relationship: static occlusion parameters, static inter arch relationship, terminal occlusion and dynamic occlusion (protrusion, laterality movements, active and inactive parts, test movements and positions), occlusion charts, then complementarily with K7 system in the Implantlogy Gnathology Esthetics Clinic, University of Medicine and Pharmacy Iasi.

We used a part of K7 system facilities as electromyography of master and temporal muscles.

The patients were prepared, their skin was degreased with alcohol and dried, after hat we placed the surface electrodes at the muscle level, we connected them to the system and we set the registration characteristics.


K7 system

We chose from the multiple possibilities offered by system the programmes Scan 9, Scan 11 and Scan 12, first offering the possibility of checking

the rest position, the two others referring directly to the muscle contraction force which lead to dental contacts.

For Scan 9 program we ask the patient to stay in rest position, the research crew assuring the proper medium for the test, it was set in the computer the needed option and we registered the muscle for 15 seconds. The resulted values must be close to zero (isoelectric line). We chose from all the lot only the patients considered to have a normal rest position (comparing clinical exam results with EMG values).
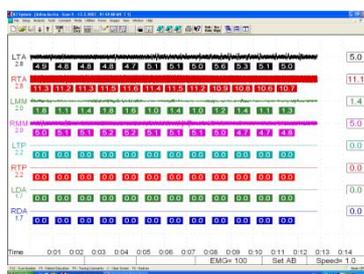

Scan 9

The number of patients considered able to respect including criteria was 31, they were further investigated with Scan 11 and Scan 12, specific programs for our study.

Scan 11 is a special created program to measure the maximal force produced by muscles in a forced byte with or without an aliment between arches. As registration protocol we asked the patients to byte hard for 2 seconds, to relax 1 second and after that to repeat the exercise. In a second stage we asked the patients to byte hard on cotton rolls placed bilaterally after the anterior protocol.

Practically with this program we registered the "maximal" muscle contraction amplitude at the maseter and temporal muscles level. It was permitted a qualitative and quantitative analysis of muscles contraction. Quantitative we measured the amplitude of contraction in mV, and qualitative we could compare the symmetry of contractions.
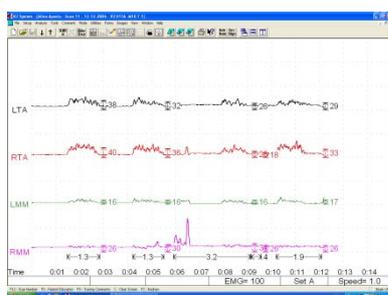

Scan 11

Scan 12 is program which permit the visualization of muscle contraction, the order and symmetry of contractions, with the possibility to investigate the first dental contact.

We asked the patient to go from rest position to maximal intercuspal position. It is the terminal occlusion trajectory and the contacts obtained, a evidence based investigation of terminal occlusion, with the possibility to detect premature contacts.

 Scan 12
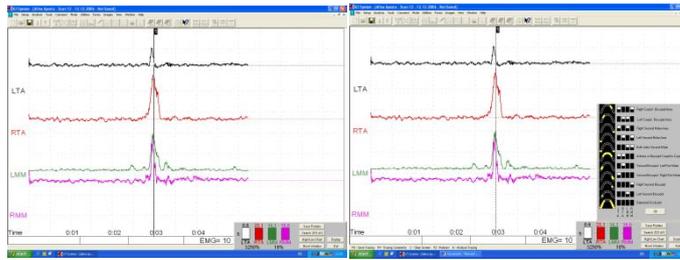
RESULTS AND DISCUTIONS: We wanted to investigate the amplitude of muscle contraction in patients with natural occlusion, effort (maximal intercuspal occlusion), and the postural terminal occlusion. Although all patients were clinically accepted to the lot considered healthy we tried to establish the amplitude of muscle contraction, the symmetry of trajectories, terminal occlusion contacts, their distribution. It is known that the presence of only one premature contact can lead to great changes in muscle activity from simple to complicated. The prolonged muscle contractions due to the bad dental contacts can lead to spasm and muscle pain. Stomatognat system always tries to rebalance the situation from two mechanisms: bruxism for "self-grinding" of teeth or to detour the obstacle with the modification of the natural mandible dynamic pathways, with reduced or great consequences for the systemic homeostasis.

That was the reason for our study, to investigate the postural terminal occlusion with modern techniques, which can offer more precision than clinical exam. To locate precisely a premature contact is sometimes a real challenge even for the most experimented dentist, program and system K7 can offer a very exact occlusion chart.

Also an instable occlusion represents an etiological factor of dysfunctional syndrome, the rapidity of clinical signs appearance depending only by individual adaptation capacity of each human organism.

We made tables with values registered to all patients, and the results were astonishing. So in natural occlusion (maximal intercuspal for 2 seconds) the values were between 12 and 68 μV, and for effort occlusion the values were 14 till 139 μV.

The significant difference between the extreme registered values suggests the individuality of each stomatognat system which dictate the self mandible dynamics and functions, specific and non specific homeostasis, the self protection are the main factors which dictate the intensity of muscle contractions. The increased values with percentages between 70 and 400% of contraction amplitude in effort occlusion are logical and show the necessity of bigger forces in order to beat the aliment resistance in the mastication process.
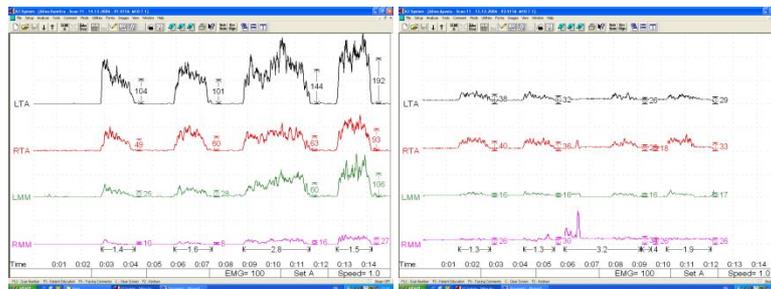

There were 4 cases in which the registered values in effort occlusion were almost the same with the ones registered in normal occlusion, but we found out that

the patients had first mandible molars missing bilaterally and one of them with Class II Angle malocclusion. Rest of the lot had increased values of amplitude of the muscle contraction in effort occlusion.

A much profound analysis could be the overlapping of EMG pathways when

we repeat the registrations, the symmetry of diagrams suggesting a muscle activity in normal parameters and its absence a muscle dysfunction, with or without direct correlation with normal occlusion.
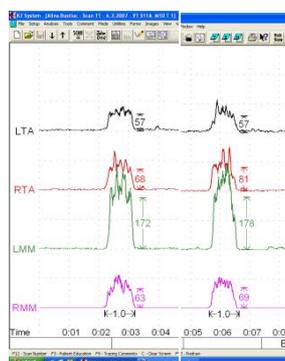
The qualitative analysis of registrations we observed that there isn't perfect symmetry, baut the values are very closed and sometimes identical. Muscle contraction knows trigger, organization, modulation and rhythm leaded so complexly that it is almost impossibly to pretend a perfect symmetry of dynamic pathways. In stomatognat system dysfunction the values would be chaotic and the images totally different, if in healthy group there were found such differences.

The next step of our study was based on the research of muscles contraction in terminal occlusion and the tracking of the first dental contacts with the program Scan 12. We could appreciate the symmetry and amplitude of muscles contraction in postural terminal occlusion, and the specific place where they are produced. The program has all that facilities making easier the dentist work when he make dental chart.
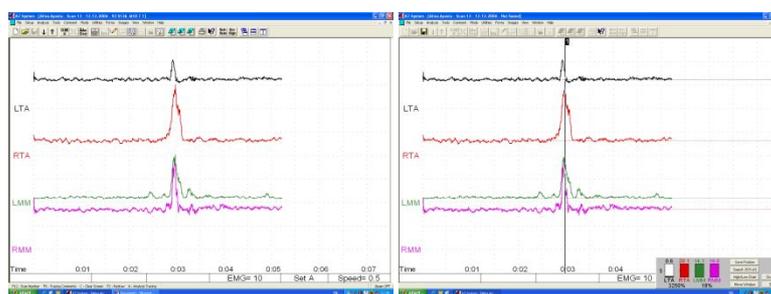
On the registered diagrams on the computer display appear the values of the muscles contraction amplitude at the maseter and temporal level. Under the columns which materialize the amplitude of contraction there are written the differences left-right in percentages. The

producer considers that for values fewer than 25% muscle can be considered with the same degree of contraction high or low. Percentages greater than 25 % suggest that the contraction on left and right side are in different records. Following the charts displayed we could
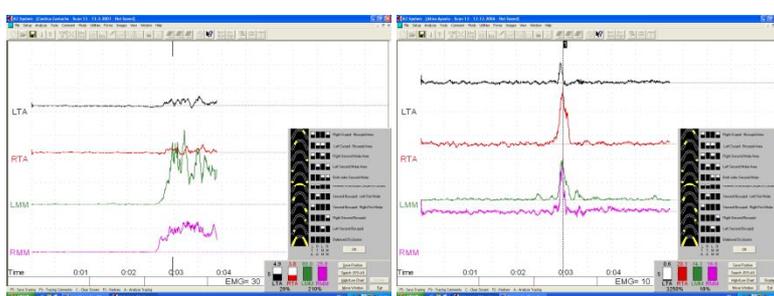
establish the dental contacts first produced. From all the lot 73% of patients presented

the following pattern:

This pattern of postural terminal occlusion corresponds to patients with stable and uniform distributed dental contacts.

In lower proportion, 21%, the primary contacts are in the anterior zone of dental arches.

There were some cases (6%) when first contact was placed at different levels as premolar, molar, on one or two teeth, as we can see in below graphics. This contacts were lost at clinical analysis of occlusion in the context of lack of other dysfunctional signs or symptoms. They

correspond to the subjects with missing teeth or malocclusion.

The present study it is considered the first step in an ample research in which after base conclusions about a clinically healthy considered lot, it will be analyze patients with dysfunctions making comparison between groups.

CONCLUSIONS

1. Third millennium bring with it a modern, an evidence based medicine, with solid, holistic principles, in which the individuality and in the same time globality can be magistral demonstrated.

2. There are in dentistry near the sharp eye of clinician a set of complementary exams which can register muscle activity and occlusion: T-Scan, EMG, K7 system

3. K7 analysis is not made as routine exam, it assume special trained personal and big costs, that's why it is indicated in patients with debut or manifest stomatognat system dyshomeostasis,

4. There isn't perfect symmetry in muscle contraction in natural or effort occlusion, the differences being lower than 20 %.

5. There is a high percentage (12%) of preclinical dys-homeostasis at apparently healthy subjects as result of bad distribution of dental contacts.

6. There is a significant difference between muscle contraction amplitude in male and female category (15%), in male's favor.

7. The stomatognat system has a great adaptability degree.

8. The patients with single missing teeth had lower amplitude in muscle

contraction, they practically protected marginal periodontium from exaggerated pressure.

9. The values of amplitude of forces in mastication process are obviously greater than normal occlusion with 70% till 400%.

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