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OCCLUSION AND ARTICULATION IN BRUXISM AND BRUXOMANIA INVESTIGATED WITH THE SYSTEM T-SCAN III

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SUMMARY:

Aim: To be analyzed common features of occlusal relationships in patients with bruxism and bruxomania at maximum intercuspation (MIP) and eccentric jaw movements.

Materials and Methods: 30 patients (22 women and 8 men, mean aged of 42,8 ± 13,3) with bruxism and/or bruxomania are examined with the system T-Scan III. Sequence of records is - at maximum intercuspation (MIP); in manual leading to central relation and in eccentric jaw movements.

In the same sequence is investigated control group - 30 people (15 women and 15 men) aged between 21 and 45 who didn't have bruxism and/or bruxomania and dentition is preserved.

Results: In the control group 85% of cases there is a balance of forces in both halves of the dental arch. In patients with bruxism is established uneven distribution of forces in MIP and articulation blockages (95%). There are three major reasons that impede spontaneous bilateral closing - force outliers (93% of cases); low force outliers (82%) and presence of interceptive contacts and sliding occurring in the beginning of occlusion time until MIP (in all patients).

Conclusions: In order to achieve a balanced occlusion in patients with bruxism and/or bruxomania required are correct diagnosis, registration and removal of preliminary contacts, articulation blockages and infraocclusion. Occlusal analysis is objective and an indicator of subsequent treatment only when it is a combination of clinical, instrumental and computerized occlusal analysis.

Key words: bruxism, bruxomania, T-Scan, occlusion, articulation

INTRODUCTION

Presence and persistence of occlusal disharmony combined with parafunctions bruxism and bruxomania is a basis for the development of craniofacial asymmetry, functional disorders and pain which occur in the masticatory system and as musculoskeletal complaints throughout the body [1 - 4]. Therefore in the diagnostic protocol of craniomandibular disorders an important place take the registration of occlusal-articulatory relationships, study of stability of the occlusion and occlusal-articulatory equilibrium.

It is known [5 - 8] that the methods of occlusal registration with articulation paper or impression materials does not have quantitative timing and descriptive power capacity, while computerized occlusal analysis allows identification and documentation of the sequence of occurrence, duration, distribution and power of all contacts. According to several authors [9 - 11] computerized occlusal analysis provides valuable diagnostic capabilities for measuring and reproducing both the positions of occlusal contacts in maximum intercuspation and during articulation.

These advantages of the digital study of occlusion may be used in diagnosis of patients with bruxism and bruxomania.

AIM: To analyze occlusal relationships in patients with bruxism and bruxomania at maximum intercuspation (MIP) and eccentric jaw movements and to bring out common features.

MATERIAL AND METHODS

Material of this study are 30 patients with bruxism and/or bruxomania (22 women and 8 men, mean aged of 42,8±13,3 years), whom has been conducted occlusal analysis with the T-Scam system.

Studies were performed in a sitting and upright position of the patient so that the sensor placed between tooth rows and the handle of T-Scan are parallel to the floor. Each record starts after pressing and releasing one button on the handle. Patients close mouth until achieving maximum contact between the tooth rows (maximum intercuspation - MIP). In the records of lateroprotrusional and protrusional movements patients close mouth until MIP and from this particular position carried out the movement. Recordings were made in real time at a frequency of 80 Hz (80 times / sec), and the sequence of tooth contacts over time was measured at intervals of 0,01 sec.

The control group is investigated with the same sequence - 30 people (15 women and 15 men) aged between 21 and 45 who didn't have craniomandibular disorders, there is no evidence of bruxism and/or bruxomania and their dentition is preserved.

RESULTS

The survey results for each patient are presented in movies (Figure 1) or graphics (Figure 2). In the control group 85% of the subjects experienced a balance of forces in both halves of the dental arch.

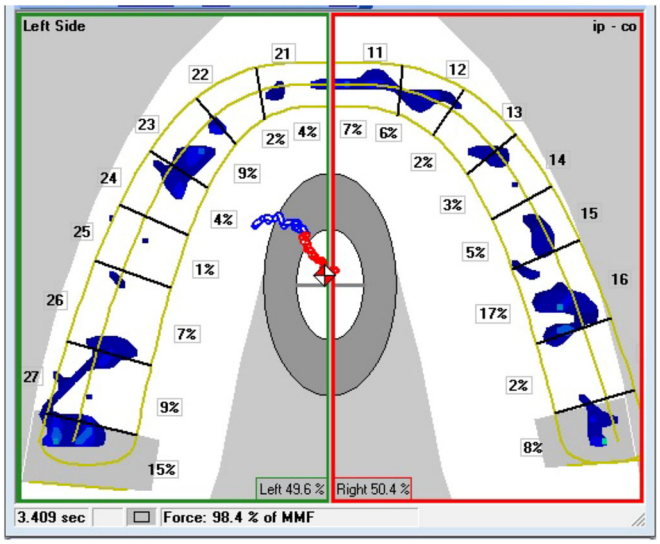

Fig. 1. Two-dimensional contour images of tooth contacts in MIP and distribution of the total force of occlusal contacts

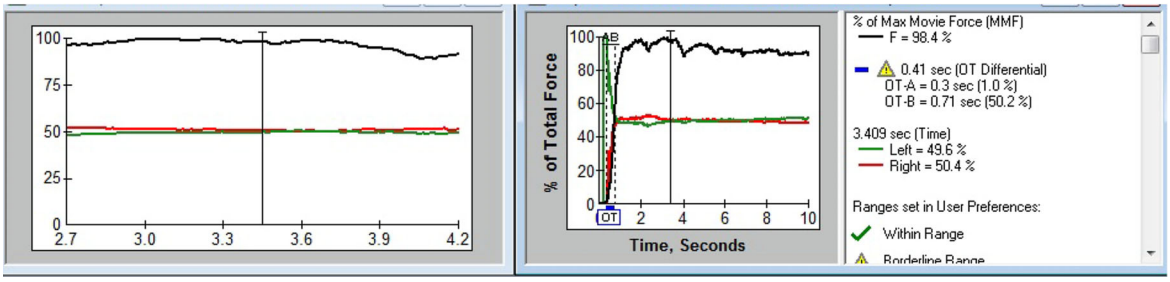

Fig. 2. Graphical representations of changes in force versus time

Patients with bruxism possess the following general features of MIP:

1. There is no balance in the distribution of forces in MIP and it is observed discrepancy in the size of the pooled occlusal forces in all patients with bruxism. In 80.0% of the cases (24 people), percentage of the total force on the left surpasses the relevant force on the right.

2. In more than half of patients (70.0%), center of force in MIP remains outside the target or the outer edge of the ellipse depicting target of the center of force (Figure 3).

3. In all investigated patients there are no stable occlusal relationships in the MIP. Established is presence of high force outliers (in 93% of cases); low force contacts (82% of cases) and presence of interceptive contacts and slidings that prevent spontaneous bilateral closing at bruxists.

Figure 4 represent a case in which spontaneous bilateral closure with balanced forces is hampered by the presence of force outlier - with much greater relative power than any other / marked in pink /.

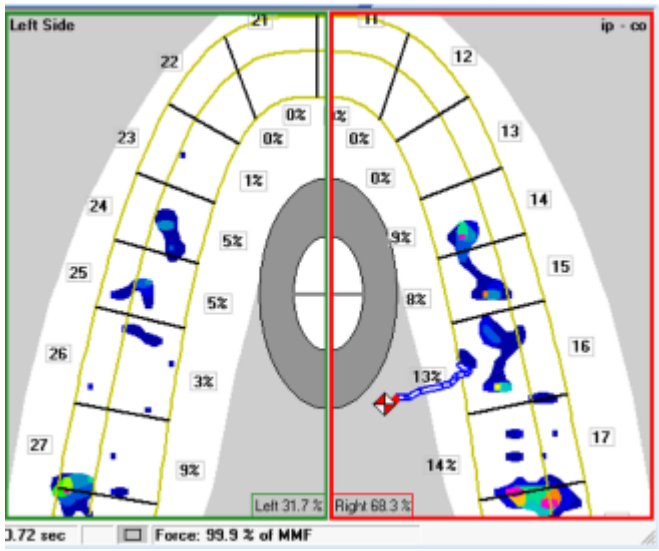

Fig. 3. Lack of balance of force in both halves of the frame with predominance of force in the right half.

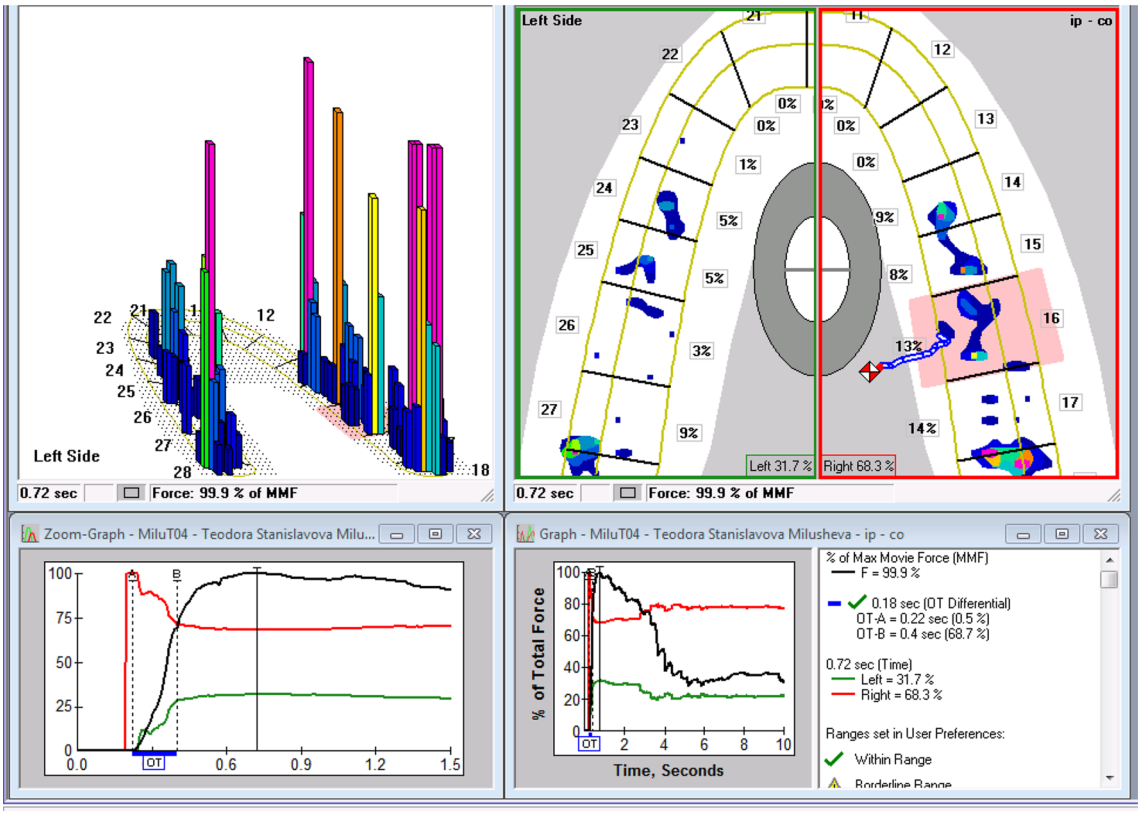

Fig. 4. Three-dimensional representation of contacts in the MIP, force outlier contacts in 16 at MIP and graphical representations of changes in force versus time.

The Delta feature is intended to identify the differences between the Max and MA movie frames, and is used to demonstrate areas representing slides and potential interceptive contacts otherwise difficult or impossible to register.

In studied patients with bruxism, however, in neither case MAX does not match to MIP and interceptive contacts are established on the way of closing (100%).

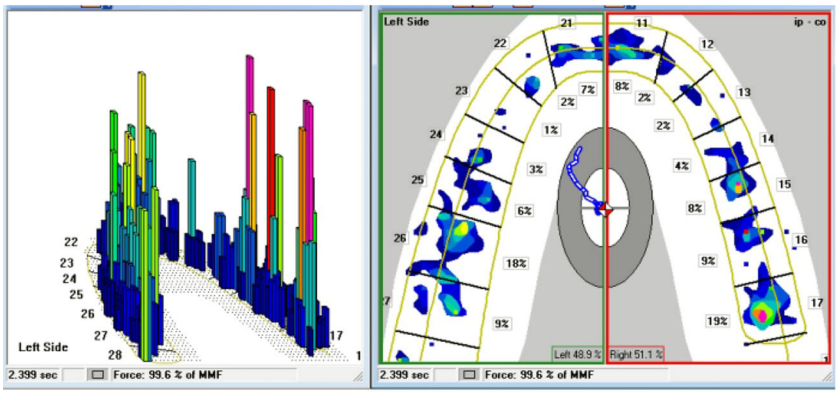

Fig. 5 Occlusal scheme at MIP

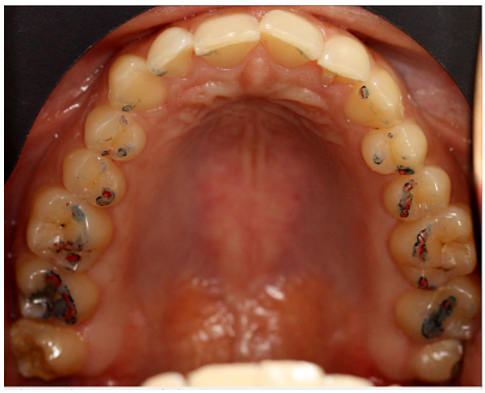

Fig. 6 Patient M.V.26 years old.: Occlusal contacts of the upper jaw at CO

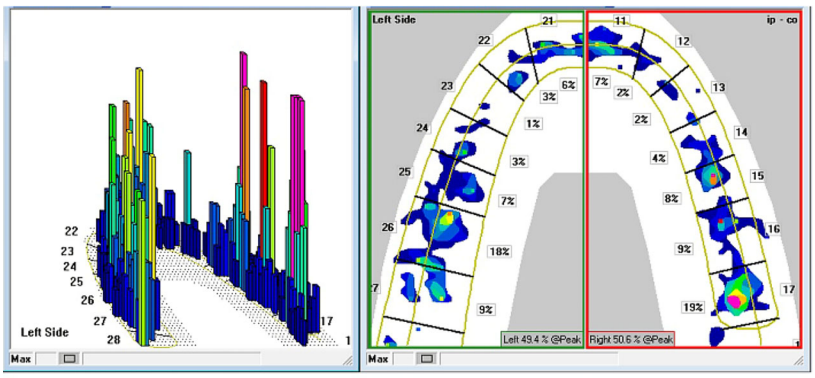

Fig. 7. Occlusal scheme at Max

Fig. 8. Patient M.V. 26 years old.: Occlusal contacts of the lower jaw at CO

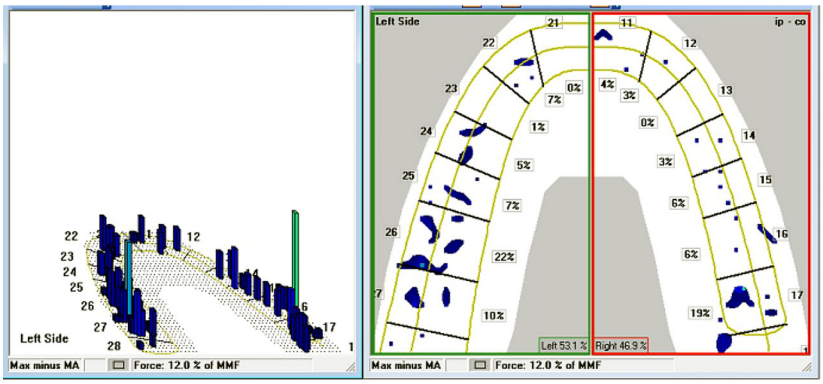

Fig. 9. Occlusal scheme at Delta

Besides study of occlusion the system T-scan allows analysis of articulation. In patients with bruxism in 95% of cases are established also articulation blocks on the way of protrusion (in 63.3%) and laterotrusion (in 86.7%).

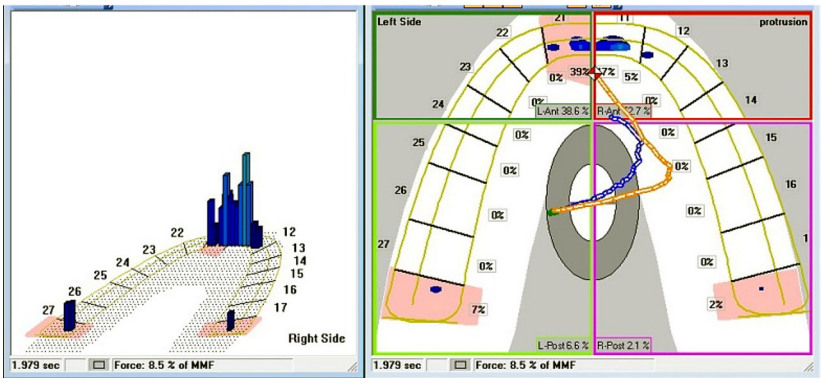

Fig. 10. Patient A.L. 24 years old. - Three-dimensional representation of forces in protrusion

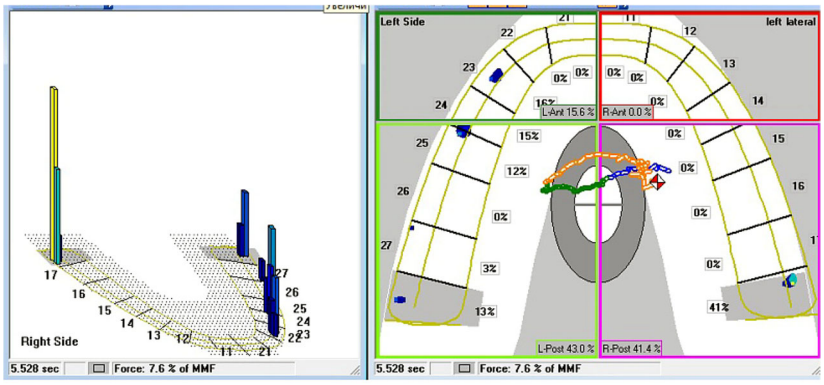

Fig. 11. Patient A.L. 24 years old. - Three-dimensional representation of forces in left laterotrusion

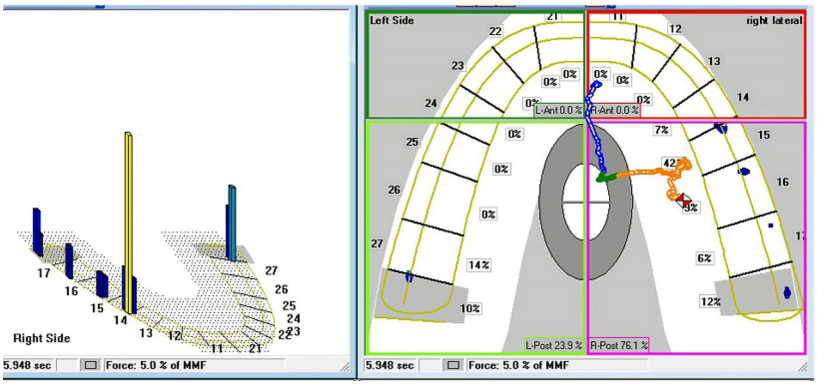

Fig. 12. Patient A.L. 24 years old. - Three-dimensional representation of forces in right laterotrusion

The results obtained from the registered eccentric movements of patients bruxists confirm the frequent need for clinical alignment of articulation imbalances, which is recommended to be carried out also under the supervision of a computerized occlusal analysis.

DISCUSSION

The study with the system T-scan showed asymmetry in terms of size, location and timing of occurrence of occlusal forces in the two halves of the dentition in patients who are bruxists and bruxomans. Probable cause for disbalance in the distribution of pooled occlusal forces is the lack of a stable occlusion. Balanced bilateral closure is hampered by high force outliers and interceptive contacts.

Computerized occlusal analysis allows presentation of occlusal forces in dynamics with respect to time with verification of interceptive contacts and slidings too.

In order to achieve a balanced occlusion in patients with bruxism and/or bruxomania required are correct diagnosis, registration and removal of preliminary contacts, articulation blockages and infraocclusion. Occlusal analysis can be considered as objective and as an indicator of subsequent treatment only when it is a combination of clinical, instrumental and computerized occlusal analysis.

CONCLUSION

For the first time in our country has been provided a comprehensive approach for the analysis of occlusion and articulation in patients with parafunctions - bruxism and bruxomania which approach goes beyond the subjective interpretation of the registration with articulation paper and refers to real quantitative data in the study of occlusion and articulation.

The quantitative timing and force descriptive capacity of computerized occlusal analysis is essential in occlusal diagnosis of patients with bruxism and bruxomania as it allows to be diagnosed important risk factors for the occlusal and functional pathology respectively. The presence of force outliers and the presence of intertceptive contacts and slides in combination with blockages on the path of articulation is very well documented by the instrumental analysis with T-scan - from the moment of their appearance during the time of their persistence until their extinction. Software provides data on the power dimension of interceptive contacts and articulation blocks, and the resulting films recorded findings and can be used for further analysis and comparison of results in alignment of the occlusion-articulation ratios as well as upon completion of prosthetic treatment.

Acknowlegments

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