

## DIRECTED REHABILITATION OF PATIENTS WITH SIGNS OF TOOTH WEAR

Valeriu Fala<sup>1\*</sup>, Vitalie Gribenco<sup>1</sup>, Vitalie Pântea<sup>1</sup>, Igor Cazacu<sup>1</sup>, Lilian Nistor<sup>1</sup>,  
Radu Bolun<sup>1</sup>, Norina Fornă<sup>2</sup>

<sup>1</sup> State University of Medicine and Pharmacy „Nicolae Testemițanu” - Chișinău, Republic of Moldavia, Faculty of Dentistry

<sup>2</sup>“Grigore T. Popa” University of Medicine and Pharmacy - Iași, Romania, Faculty of Dentistry, Department of Oral Implantology and Prosthodontics

\*Corresponding author: Valeriu Fala, DMD, PhD;  
State University of Medicine and Pharmacy „Nicolae Testemițanu”  
Chișinău, Republic of Moldavia

### INTRODUCTION

The functional diagnostics is an integral part of the contemporary stomatology. Despite the fact that the masticatory organ represents a complicated system of structural and functional connections, doctors often neglect the careful diagnostics of this crucial organ. One of the reasons for this situation is, probably, the lack of a common opinion about the methods of diagnostics. Divergence of opinions causes a sense of uncertainty and even fear of using systematized and functional diagnostics in daily activity. At the same time, the result of any treatment is unpredictable without a competent diagnostic research.

The search of causes of functional disorder requires implementation of systematized methods that could be adapted to every individual clinical situation. The decision of treatment should be based on the diagnosis. The correct DIAGNOSIS is the goal of diagnostic procedures and examination, but the goal of the correct DIAGNOSIS is a correct treatment plan. An optimal treatment plan can, therefore, only be performed after a functional, structural and aesthetical analysis of patient's oral cavity and face, x-ray

examination, axiography, and after an examination of the plaster models fixed in the articulator by means of face bow. All the information about any kind of planned corrections of the teeth should be provided to the dental technician in the lab form. The dental technician then combines all such information and implements all the modifications indicated by the doctor related to planned correction of the teeth to make a diagnostic wax-up model. Proper adjustment of occlusal splints and temporary provisory crowns for directed treatment purposes in the oral cavity gives the doctor possibility to estimate the effectiveness and the correctness of the modifications that were made in teeth alignments; allows them to achieve an adequate aesthetic and functional integration of the restorations, a direct or an indirect technique.

*1.1. Treatment of the oral mucosa with getting a healthy condition of the gums, directly by integrating biological provisional restorations or the tray by means of keeping this outcome at all stages of rehabilitation.*

The final prints of the dental arches, precisely the impression of the already modified jaws prints and recordings regarding

the set up positioning of the maxilla with the mandible using the facial arc were used to prepare the occlusograms. Occlusograms served as guidelines for the dental technician to prepare correctly the permanent prosthetic bridge (indirect method), as well as, functional and aesthetic restoration of teeth (direct method). In the direct method, a sample of modified models is used and reorganized in clinical and instrumental functional analysis (modeling wax) with the help of adaptable articulator and condylograph (4). This prepares the soft tissue before the final teeth restoration in the direct method. However, the major reorganizing interventions into the teeth-maxillary system must be gnathologically verified.

A careful selection of materials and methods need to be done for manufacturing permanent dental restorations, finishing functional rehabilitation and optimal integration of permanent restorations.

## **GNATHOLOGY – HISTORY AND TERMINOLOGY**

The term, “Gnathology” was introduced by Stallard, the famous clinician and researcher, in 1924. The dictionary of orthodontic terms gives the following definition of this term: Gnathology – an area of stomatology that studies anatomic, histological, physiologic and pathologic aspects of static and dynamic interaction of occlusion, temporomandibularis and masticatory systems as a single whole and, also questions of diagnostics and dysfunction treatment of the indicated system.

The term “Articulation” was introduced in dentistry by Bonville, a well-known scientist in the middle of the 19th century. On the basis of numerous anthropometrical researches, he showed that the centers of both heads of mandible and the contact point of the medial angles of the lower central incisors

make a triangle with a with 10 cm medium length– the so called Bonville triangle. In 1858, Bonville made an articulator with some horizontal condyle paths and intercondylar distance that is equal to 10 cm, and strongly recommended studying the static and the dynamic components.

One of the first stomatological societies was created in 1926 by McCollum. Together with Garlan he designed the first effective method of the localization of horizontal hinge axis and introduction of bite registration into the articulator using the Snow face bow. The representatives of the American School of Gnathology share the principle of balanced occlusion in teeth restoration. McColum was the inspirer of this school. In 1955, McCollum and Stuart published a research communication in which they formed the principles of the mandible movements, transversal horizontal axis, correlations between upper and lower jaws in articulator, designed for the reproduction of the oral cavity conditions. The articulator was meant exactly to imitate the jaw relationship to the maxilla, record the parameters of occlusal surfaces and to reproduce the mandibular functional movements. The recording of the sagittal and horizontal movement of the mandible was meant to determine the maximum height of the cusps and the depth of the occlusal fossa, and also to map the correct placement of ridges and cracks. Earlier doctor Gizy began to use the articulator, in order to, model occlusion surfaces of the artificial teeth. His theory about facets-cusps contacts was used for making the fully removable prosthesis using the balanced occlusion conception, being one of the most important theories in the stomatology of the 20th century. Stuart denied the validity of the concept of balanced occlusion as he noticed the non-equal abrasion of the oral and lingual cusps and the formation of displacement of occlusal

contacts that were changing the jaws interlocking character, as a result of which, the patients complained about losing their chewing effectiveness and biting off their cheeks and tongue, instead.

Main terms of Gnathology are occlusion, centric relation, the anterior guidance and the vertical dimension of occlusion intercuspide position. Highly significant determinants of jaw movements are recorded with special apparatus, which help in understanding the occlusion and other major parameters of gnathology.

Currently the most widespread concepts of occlusion are:

- The concept of balanced occlusion
- The concept of group function on the laterotrusional side
- The concept of canine guidance
- The concept of miocentric occlusion
- Functional-generated path according to Pankey, Mahan, Staehle
- Modified canine guidance - The Panki-Mann-Shuiler theory in total occlusion reconstruction aims to create simultaneous contacts of canines and posterior teeth on the dental arches on the laterotrusional side, in protrusion only, with the front teeth contact
- Occlusal concept of consecutive malocclusion of dominant canines.

In 1968 Ramfjord and Ash had proposed the concept of "free center contact," according to which the lower dental arches can shift to centric occlusion position (maximum intercuspal position). The predecessors of Ramfjord and Ash, Peacocks and Lundeen, however, supported the concept of "point-contact center", according to which "one tooth is always subjected to two antagonists". In 1982, Tomas proposed the "tooth-tooth" concept that was very difficult in implementation. Furthermore, the contemporary concept "consecutive

malocclusion with dominant canine teeth", as proposed by Professor Rudolf Slavicek is also quite difficult to realize, but it is very close to the functional nature conception assuming the fact that there are no naturally occurring concepts of occlusion.

The main point of the concept by Prof. Slavicek is the fact that the teeth malocclusion in laterotrusion guidance should be done according to the following sequence: first molar, second premolar, first premolar followed by canine in the end. An important remedy, in the occlusion reorganization, according to the given concept, however, lies on the restoration of the lower jaw teeth that serves as a template for upper jaw teeth restoration.

It is necessary to pay a great importance to the "occlusal key" - the first permanent molars. The trajectory guidance of the sixth tooth on the maxilla in laterotrusion is necessary in directing the movement of the sixth tooth on mandible. Accordingly the sixth tooth on maxilla serves as the main target in laterotrusion during mixed dentition, thereby, playing an important role in forming the final condylar slope of temporomandibular joint (TMJ). Precisely, the part of the sixth lower tooth, the medial vestibular tubercle, moves on the slope of the medial vestibular tubercle of the sixth upper tooth, thereby, causing malocclusion of its other part, the seventh and the eighth tooth. The next important formation of the first upper molar is the diagonal slope that forms the first "retrusion control". The upper molar, thus, holds the disto-vestibular cusp of the sixth lower tooth, including the mandible movement, in retrusion, giving the growth area the opportunity to form the mandible correctly.

The second premolar produces the molar disocclusion in laterotrusion and doubles the first premolar function. The first premolar, which is often sacrificed by orthodontists, has

the most important function, as being in contact with the lower arch antagonist. Also, the first premolar produces the disocclusion of the molars and the second premolar. In case of abrasion or canine loss, the first premolar becomes the main target in laterotrusion and, in this case, it works together with the lateral incisor of the upper jaw. The first premolar of the upper jaw, having the palatal cusps, ideally should make contact with the distal fossa of the first lower premolar, thereby forming the second very important "retrusion control" together with the vestibular cusps of the first lower premolar (I Angle class) (4).

The maxillary canine, being in contact with the vestibular cusp of the first lower premolar provides the protrusion movement on the distal prominence (the first 1-2 mm in its path). Canines are the strongest teeth, which produce the disocclusion of all the other teeth in laterotrusion. A small disocclusion (1.5-2 mm) or a light touch in the incisor region is normally required.

All groups of teeth are responsible for certain functions. According to Professor R. Slavicek, the the molar teeth maintains the centric relationship and stabilizes the vertical dimension of occlusion, thereby, protecting the pterygomandibular ligament in compressions, in order to, exclude the eccentric forces upon it. During growth (permanent dentition formation), the molars work in groups and provide the control in laterotrusion and retrusion. The group function of the molars is to ensure laterotrusion.

The lower incisors are sharp, in case of, the upper frontal teeth, and are perpendicular to the closure axis (rotation) during the mandibular movement. Lower incisors represent the main factor in dentoalveolar compensation, and also take part in the diction control. However, the upper incisors do not take part in the mastication act; instead

they take part in the act of speaking, and thus, represent the modified sensory organs that work together with the soft tissues to create and aesthetic (4).

## GOALS AND OBJECTIVES OF THIS RESEARCH

In this study, we aimed at implementing of the concept "sequence of the dominant canine disocclusion" in the rehabilitation of the functional-aesthetic occlusion, using the direct method. In order to achieve the goal of this study, following issues need to be addressed.

- For customizing the complex treatment of the patients with advanced dental abrasion, the importance of condylocomp will be considered to obtain occlusion parameters.
- Direct method using functional-clinical and instrumental analysis by means of adaptable articulator, facial arch, occlusal registers and the condylocomp will be used for the optimization of occlusion in restorative therapy.

### Purpose / Objectives:

As the goals of this study, we used "consecutive occlusion" in the rehabilitation of functional-aesthetic-directed occlusion (FADO) using the direct method. Various objectives this goal will cater to are:

- Rehabilitation of occlusion function using, aesthetic restorative therapy, (direct method) by implementing the "disocclusion consecutive canine dominance".
- Study of the importance in obtaining condylographic parameters of occlusion complex, thereby individualizing therapy in patients with advanced tooth wear.
- Optimization of occlusion in restorative therapy using the direct method. Here, we plan to use articular mounted models as occlusal landmarks for clinical, instrumental and functional analysis of

data for studying condilography.

## MATERIAL AND METHODS

This study involved 43 patients, aged between 21 and 58 years (17 men and 26 women), who were used in dental restorations. Conformation method was the method of treatment used for reorganized occlusion. For analysis, diagnostics and rehabilitation of occlusion were considered important to study the functional movements of the mandible. Treatments directed towards optimizing occlusion were performed as "conformation" or "reorganized". The treatment method "conformation" involved keeping the existing maximum intercuspitation in a stable position (PIM) that can lead to a change in the ratio between the reference position of the mandible (PR) and maximum intercuspitation position. The method "reorganized" comprised of closing the gap between the reference position of the mandible and position of maximum intercuspitation. This method of treatment allowed a maximum intercuspitation of new stable positions near the reference position of mandibulae.

Patients were divided into two groups: Group I consisted of 17 patients (7 b 10f) who were subjected to the "conformation" method of treatment (MCT). Group II, on the other hand, comprised of 26 patients (10b. 16f). "Reorganized" method of treatment (MRT) was applied to the Group II patients.

### *Criteria for selection for Group I patients*

The first selected batch of patients showed symptoms of occlusal dysfunction. Clinical examination in these patients exhibited mild signs dysfunctional occlusions that were manifested by significant wear elements of occlusal morphology.

### *Criteria for selection for Group II patients*

The Group II comprised of the patients having obvious symptoms of occlusal

dysfunction, also muscle and joint dysfunction.

### *Clinical examinations of Group I patients*

Various clinical examinations, laboratory and instrumental methods Group I patients were subjected to: imaging, study models mounted adjustable articulator according to data recorded with facial anatomic arch. Modelling diagnostic wax occlusions were performed according to the parameters like the occlusal plane, the angles of slopes dental tubers, the tuber angle dental disocclusion; correlation "over- bite " and " over-jet" and mean condylar joint trajectories using the orbitalis plane as the reference axis.

### *Clinical examinations of Group II patients*

Various clinical examinations, laboratory and instrumental methods group II patients were subjected to: orthopantomography, CT; study models mounted adjustable articulator according to data recorded with angular facial arc; condilography, which allowed us to record ABT and trajectories condylar joint individual TRG. Contrast Roentgen ball positioned on the skin points indicating ABT individual parts and the lower edge of the orbit was also performed, which allowed determination of the orbital axis plane in these patients.

## RESULTS AND DISCUSSIONS

Effective treatment and prognosis are impossible without close cooperation between the dentist and the dental technician. Results of rigorous aesthetic and functional analysis and laboratory investigations were first taken into account by the dental technician. In turn, having received results, the dental technician performed the modelling in wax and appropriate provisional dental restorations. So, it was considered to be the joint responsibility of the dentist and the dental technician for any clinical decision, to be

made. As per the laboratory investigation results, generated by the dental technicians, we have systematized the data sheet. This data sheet comprises of assessment of aesthetics like facial smile analysis and lips profile.

In Group I patients, after clinical examination and occlusal assessments using various laboratory instruments, described above, morpho-functional and aesthetic rehabilitation of the damaged tooth surfaces were performed by direct conformation restoration method. Conformation method of treatment was performed to rehabilitate elements of occlusal morphology, in correlation with other parameters without occlusion. Treatment goals were achieved by obtaining symmetrical, functional and dental contacts, as well as, simultaneously achieving a balanced and appropriate aesthetics.

In Group II patients, after clinical examination and occlusal assessments using various laboratory instruments, morphological and functional rehabilitation were first performed using aesthetic dental arches and stomatognathic system elements (TMJ and masticatory muscles) by the reorganized method. This method of treatment was to rehabilitate correlative parameters of occlusion by removing the signs dysfunctional occlusal rails (trays), according to initial condilography. These occlusion corrective devices were worn by the patient for 4-6 weeks, after which the

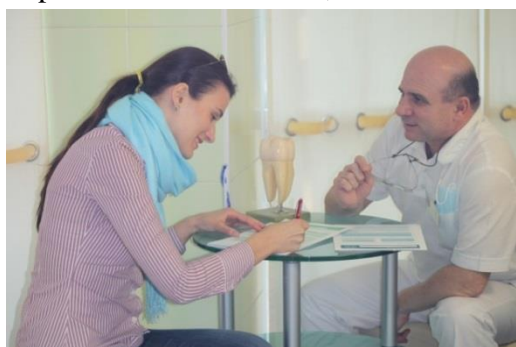
patients were subjected to fresh rounds of condilography followed by occlusal key rehabilitation indirect method as directed molding wax. In the end, rehabilitation of occlusion was performed by functional-aesthetic and directional correlation of individual parameters for occlusal restoration using the direct method.

At the end of four weeks of the entire course of rehabilitation treatment, condilography was performed to confirm the status of the stomatognathic system. Clinical monitoring of the functional status of the muscular system was carried out, as well, at all stages of treatment and data recordings were done.

The results, including discussions with the patient with the dentist leading to correct diagnosis followed by the course of treatment can be summarized in the following headings.

#### *Discussion session, information and initial investigation steps*

In addition to, the methods described in materials and methods section, the course of individualized treatment also included a personal discussion of the dentist and the dental technician with the patient. Only by means of such personal discussion, with the patient, the necessary information for successful diagnosis can be obtained. The entire course of treatment, right from the diagnosis involved the following steps:



a)



b)

**Figure 1. Individual discussion with the patient and filling in the questionnaire by the patient**

A. Basic complaints – Discussion of the dentist with the patient to understand the main complaint, which made the patient see the dentist, at the first place, was the first step in treatment (Figure 1a).

B. Medical anamnesis – This was a document, in the form of a questionnaire to be filled by the patient. This document brought the facts related to previous and present medical conditions of the patient and family history of various medical conditions. Such a document had brief, clear and properly structured questionnaire to be filled by the patients, for each of our study groups (Figure 1b).

C. Dental anamnesis – This document had a questionnaire for patients regarding the complaints or functional status of the masticatory organ. Also, questions concerning trauma of the head, neck were

included in dental anamnesis, which are important for dental intervention (Figure 1b).

D. Examination by the dentist for general occlusal parameters - Followed by the discussion of the patient with the dentist and filling of documents by the patient related to medical anamnesis and dental anamnesis, the patients were examined by the dentists for basic occlusal parameters (Figure 2a and b). The initial assessments performed by the dentist were the occlusal index, determination of the patient's mental state, subjective assessment of the general condition (medical and dental) of the patient and the need of treatment.

E. Pain analysis - The analysis of chronic pain, if there is such pain in the shoulders, neck, and head region was also investigated by the dentist (Figure 2a and b).



a)



b)

**Figure 2. Symmetrical and uniform palpation of masticatory exobuccal muscles**

*Functional clinical analysis and data recording*

Followed by the initial investigation steps, clinical functional analyses were performed, in order to assess the functional status of the masticatory organ.

Data regarding the functional status of the masticatory organ were obtained from the clinical functional analysis. The various steps involved in functional clinical analyses were:

- The comparative palpation of muscles

(masticatory organ)-Manual palpation in relaxation and tone was carried out to determine the objective and subjective parameters of separate groups of muscles and allowed detection of pathological symmetry (Figures 3 and 4).

- Analysis of the mandible movements – This was done by evaluating the active and passive movements, and the final state and elasticity. All these data were recorded in a table and were analyzed

individually.

- TMJ Status – The palpation and hearing were performed, and the active and passive movements of the lower jaw were analyzed understand TMJ status.
- The preventive neurological data – This involved the timely detection of the presence of neurological symptom, if any,

by the dentist and was followed up with a neuropathologist, if necessary.

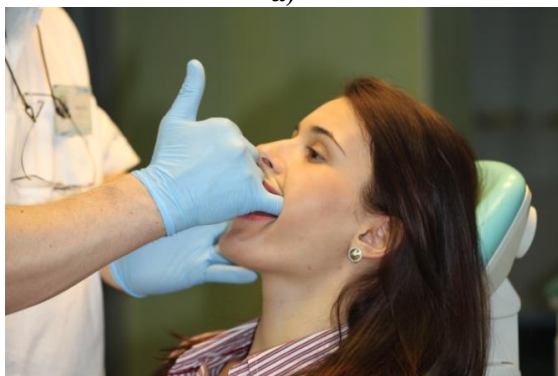
- Clinical diagnosis of occlusion and articulation - This involved the advanced assessments of the teeth conditions by evaluating integrity, vitality, fillings, restorations, dentures and veneers abrasion (Figure 5 a-g).



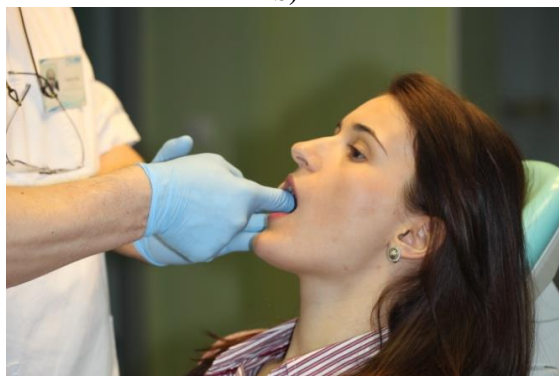
a)



b)



c)

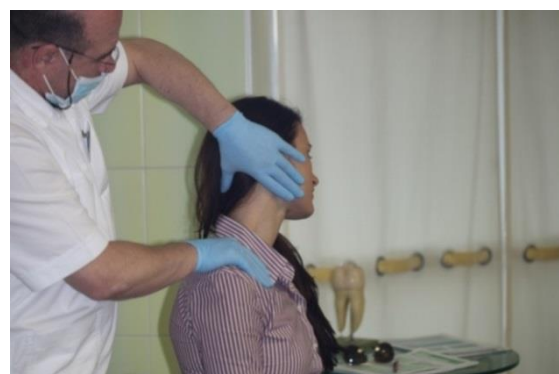


d)

**Figure 3. Symmetrical and uniform palpation of masticatory endobuccal muscles**



a)



b)

**Figure 4. Symmetrical and uniform palpation of masticatory exobuccal muscles**

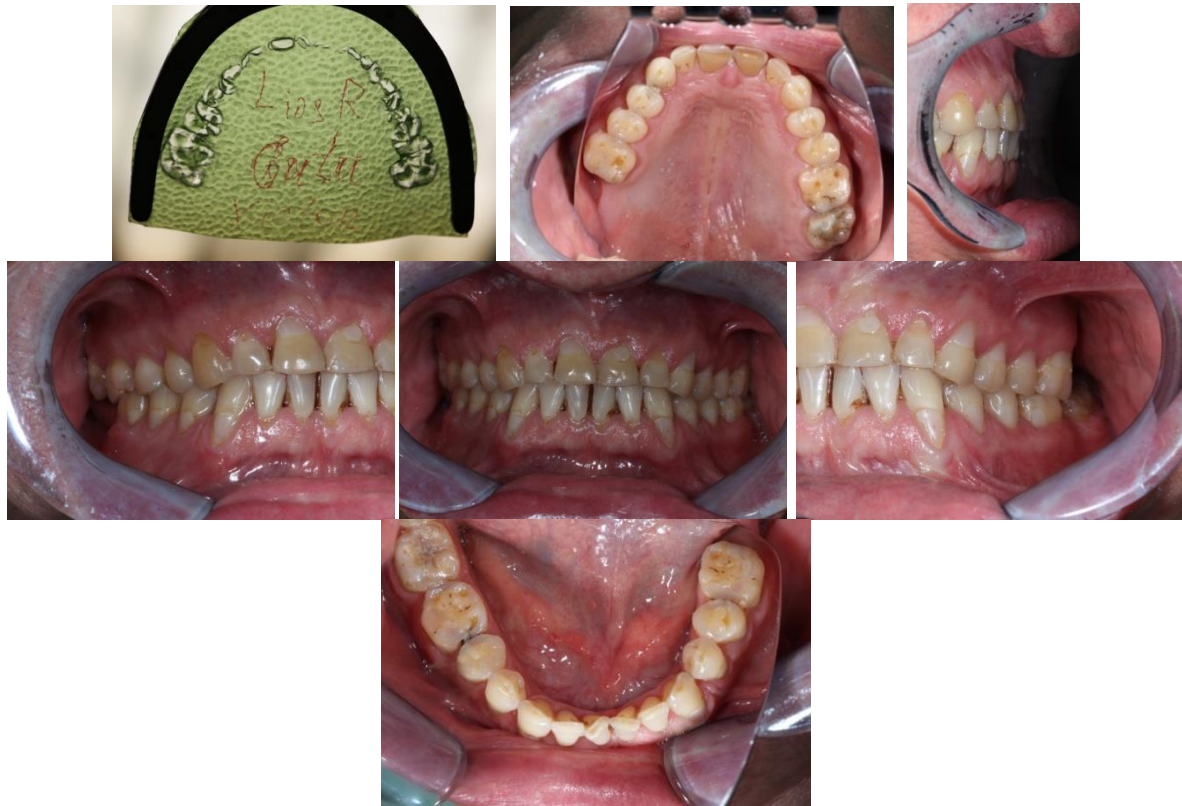
**CLINICAL CASE:**

*Case presentation:* A specific case study for this paper involves a patient G.V, who

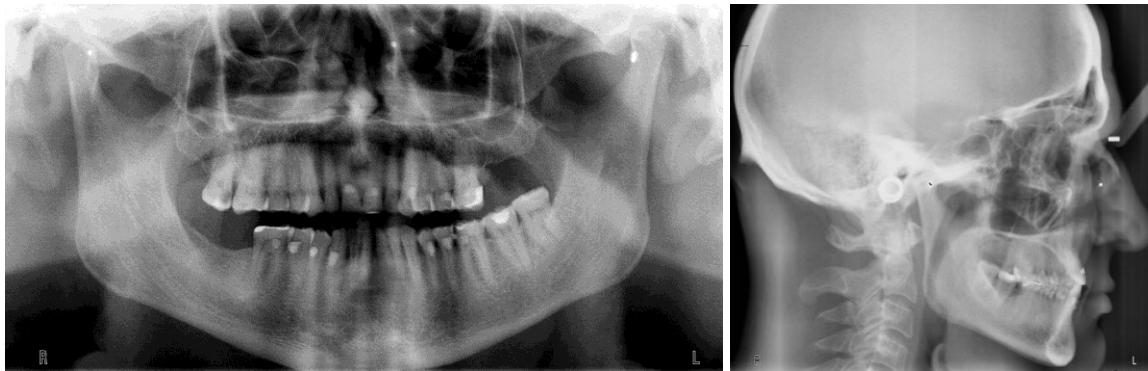
was 44 years old, and came to C.S. “Fala-Dental” complaining about the pain in the region of certain teeth, difficulties during

mastication due to dental abrasion. During primary examination, a poor oral hygiene, multiple fillings on the occlusal surfaces and

the parcel area caries and enamel cracks, as a result of, abfraction were identified (Figure 5).



**Figure 5. Occlusiography. Structural functional and aesthetics analysis of the mouth**



**Figure 6. Orthopanthography + Lateral X-Ray before the occlusion restoration**

Patient filled the standard questionnaire independently (Figure 1b), which included questions regarding the medical and dental status of the patient. During the discussion (Figure 1a), the patient confirmed that he was not allergic to any kind of medical preparations including anaesthetics. An allergogram was performed towards various anaesthetic preparations. The patient did not

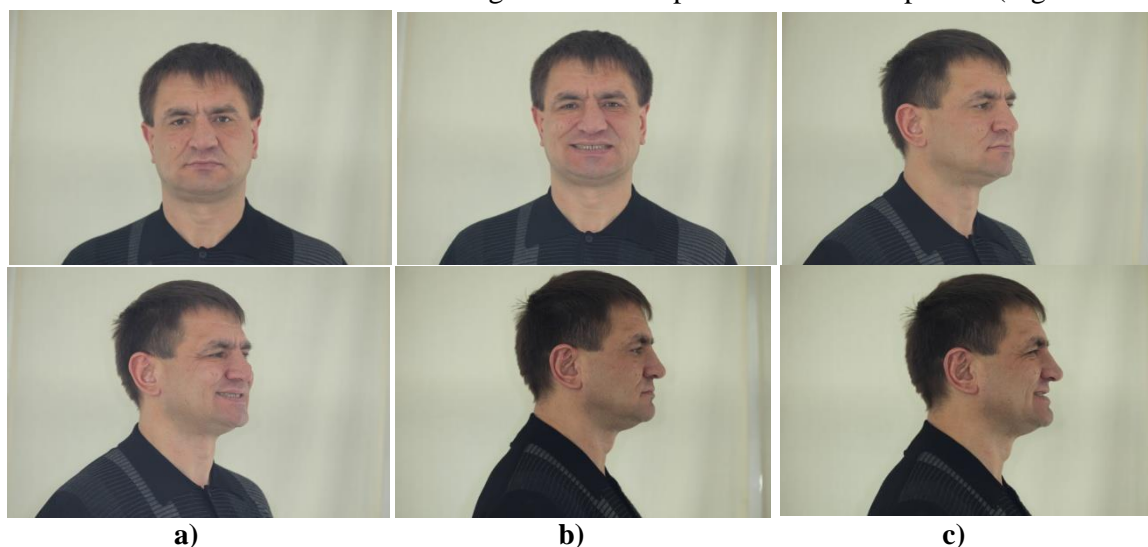
suffer from cardio-vascular diseases, chronic diseases, and infectious diseases like hepatitis B, C or HIV-infection.

*Roentgenologic investigation:* A mandatory stage of laboratory tests was performed, in order to assess the dental arch in entirety. Panoramic radiography (Figure 6 a and b) was required in targeted treatment planning but was not sufficient for

periodontal examination. Teleradiography is designed to examine changes in bone structure (Figure 6) to perform the cephalometry and assist in adding on to the information to other examination methods such as computed tomography (CT) and magnetic resonance imaging (MRI).

The exobuccal examination involving the

analysis of the face to determining the presence or absence of facial asymmetry or disharmony, analysis of the lower floor taking into consideration the vertical dimension of occlusion, occlusal plane, the nasolabial fold, the smiling line, buccal vestibule, interincisive line and the midline of the face was performed for this patient (Figure 7 a-c).



**Figure 7. Rigorous study of the patient's face, determining the presence or absence of facial asymmetry or disharmony, lower floor analysis considering the vertical dimension of occlusion, occlusal plane, nasolabial fold, smiling line, buccal vestibule, interincisive line and the midline of the face.**

While analyzing the maxillofacial complex attention was paid for the presence of pain, asymmetry, and muscular hyper tonus by means of comparative palpation of masticatory muscles (Figure 3 a-d and Figure 4 a and b). Various regions, which were examined by palpation involved cervico-humeral region, temporal muscle, masseter muscle, sternocleidomastoid muscle, pharynx, and temporomandibular complex.

The results of comparative palpation of masticatory muscles were recorded in the standard questionnaire format of the patient.

During the endobuccal examination, we did evaluate the following parameters (Figure 3 and 4):

- Hard dental tissues and the possibility of conservative root treatment.
- Periodontal status: The level of the oral

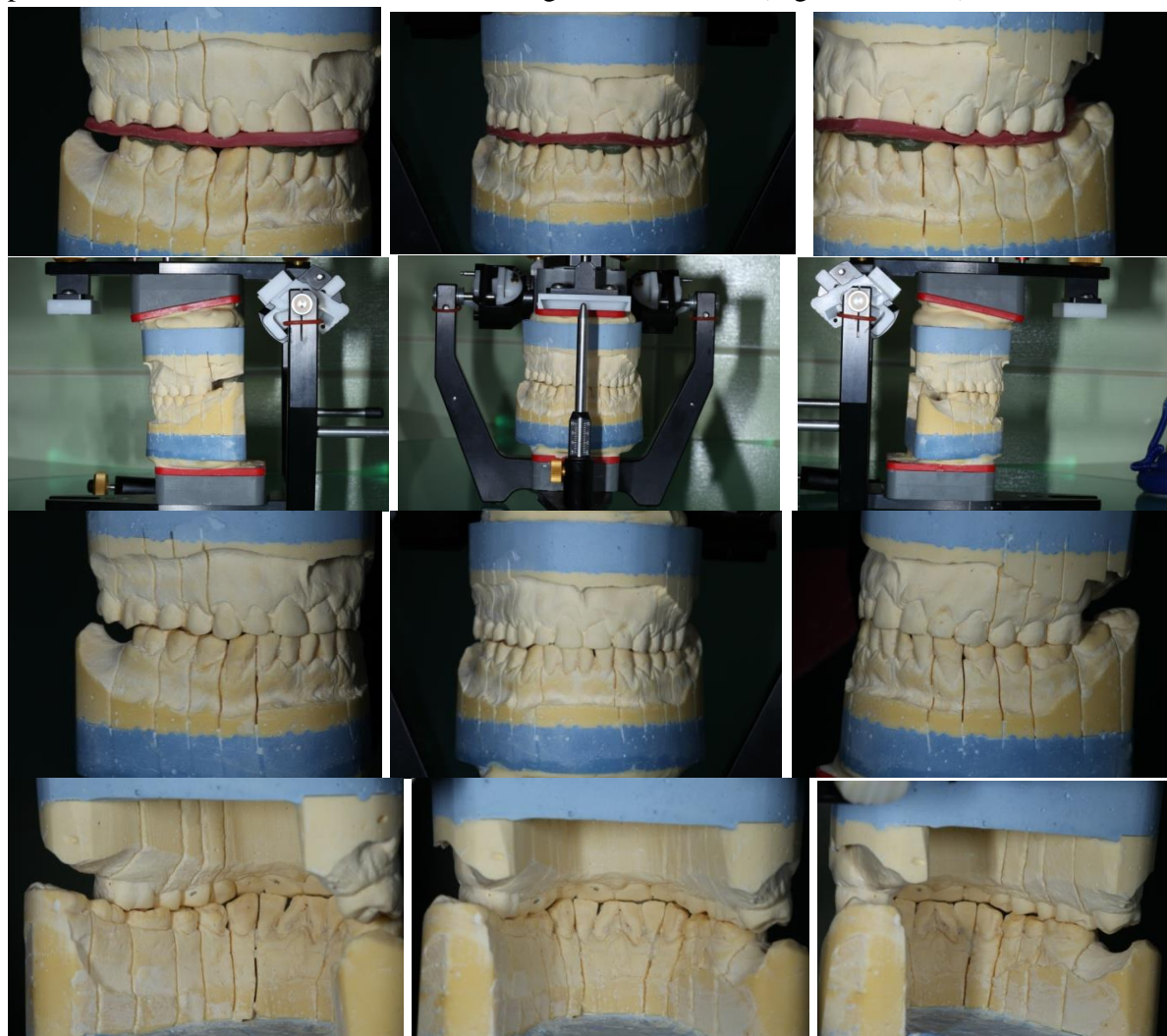
hygiene, the recession degree, the presence of the bleeding, gum, mucosa and bone defects.

- Occlusal relationships: Occlusion stability was checked. An occlusogram was prepared, in order to, determine the difference between the maximum intercuspal position and centric relation. Also, the vertical dimension of occlusion was determined.

Also, comparative palpation of masticatory muscles was performed. The major masticatory muscles palpated in this case study were Medial pterygoid, Digastric muscle, Buccal floor, Tongue, Suprahyoid muscles and Muscles infrahioidieni. The results of endobuccal clinical examination were introduced in the standard patient questionnaire. Plaster models were fixed in

the adjustable articulator with the help of the face bow and the registration of the posterior contact position of the mandible represented the initial situation of the oral cavity (Figure 8). Paying attention to the dentist's indications, the dental technician had performed the directed wax modelling,

(restoring the vertical dimension of occlusion with +5 mm on the incisal table) (Figure 9) and had created the correct occlusal relationships between the frontal and lateral teeth, implementing the modern concept of "consecutive disocclusion with canine dominant"(Figure 9 and 10).



**Figure 8. Analysis of the plaster models in the „Reference Gama Dental” articulator in posterior contact position**

Clinical examination with filling in the questionnaire, the complete series of intra oral X-ray investigation, functional clinical and instrumental analysis allows us to establish the correct diagnosis. According to the established diagnosis, we established an optimal treatment plan, which involved:

1. Professional hygiene of the buccal cavity;

2. Roentgenologic examination

3. Removal of the pressings and modeling deconstructable plaster models.

4. Receiving the occlusiography and the registrants in the back contact positions of the mandible (Figure 7c)

5. Plastering of the diagnostic models in the adjustable articulator using the obverse arch in the back contact position and

intercuspal position (Figure 8).

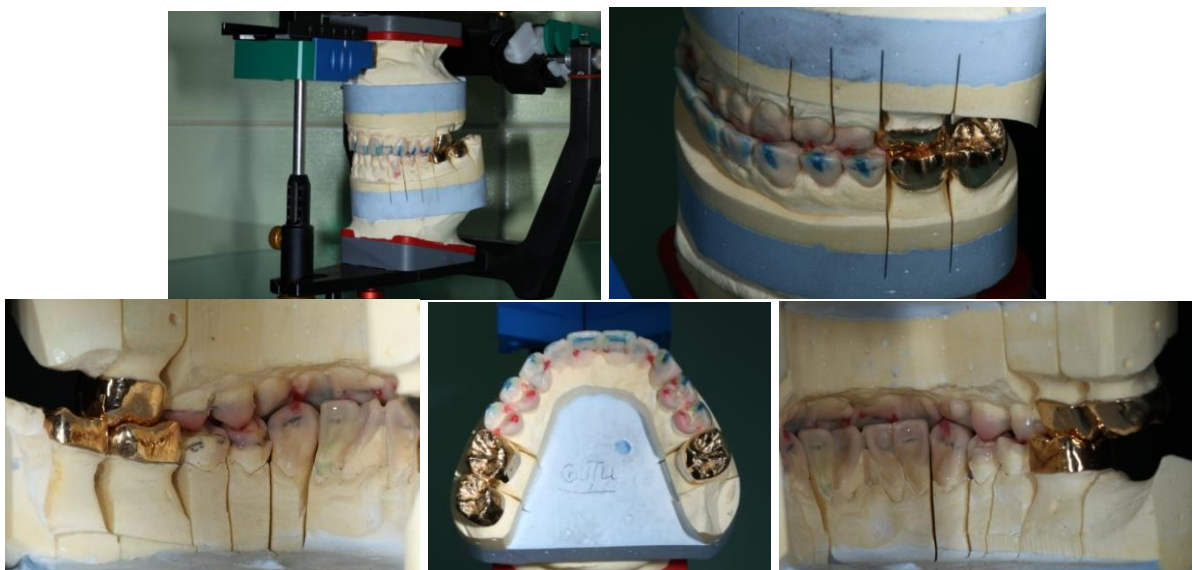
6. Minor functional analyses
7. Major functional analyses
8. The analysis of the occlusal parameters
9. Modelling of the healing splints
10. Diagnostic wax modelling of the teeth

with a reorganizing component, following the requirements of the consecutive occlusion with a canine dominant conception.

11. Aesthetical restorations of the teeth using the direct method using a general model.
12. Modelling of the prophylactic splints.



**Figure 9. Modelling form wax of upper and lower teeth number 6 and 7 on the occlusal surface of 4 degrees on the height of 5 mm on the incisor pin taking in consideration the principles of the consecutive disocclusion with a canine dominant.**





**Figure 10. Fixing the crowns made of golden alloy on plaster models and wax modelling of the teeth taking in consideration the principles of consecutive disocclusion with a canine dominant**

## CONCLUSIONS

1. The implementation of the "disocclusion consecutive canine dominance" principle of the "consecutive disocclusion" concept by R. Slavicek, in the restorative therapy, using the direct method, allowed to obtain a functional-aesthetic-directed occlusion (FEDO).
2. The FEDO individualization was possible due to the fact that the rehabilitation was carried out in the "individual simulator" represented by the stomatognathic system of the specific patient.
3. Condylography is a tool for a quick registration of mandibular movements, of a graphic registration of a condilar trajectory with exact determination of condylar path. These registrations provided us necessary occlusal parameters for programmable articulators and helped in obtaining fully individualised direct treatment planning.
4. Clinical functional analysis, functional instrument analysis, adjustable articulator, facial bow, cephalometry, condylography raised the possibility to optimize occlusion. Again, taken together, the treatment improved the quality of life of the patient to a great extent.

## REFERENCES

- 1 Forna Norina., "Protetica dentară" Editura "Univers encyclopedic" 2011.
- 2 Bârsa, G., Postolachi, I (1994). "Tehnici de confecționare a protezelor dentare" Pages-398.
- 3 Bratu D. Noțiuni de ocluzologie. (partea II-a) Disfuncția temporo-mandibulară. LITO U.M.F.T. – Timișoara 2002.
- 4 Duglas, A., Terry, D.D.S., & Geller, W.(2013). Aesthetic & Restorative Dentistry. Pages 70-73.
- 5 Fradeani, M. (2010). Prosthetic Treatment. Pages 599-612.
- 6 Howat, A.W., Capp, N.J., & Barrett, N.V.J. (2013). Occlusion and Malocclusion. 2005. – 235p.
- 7 M.M.Antonic. // DentArt. – 2010. –Nr.4. – 35-40 p.
- 8 Massironi, D (2008). Precision in dental aesthetics. Pages 422.
- 9 Ordoevskii, T (2010). Quintessence international., 79, Pages 88.
- 10 Slavicek, R. (2008). The Masticatory Organ. Functions and Dysfunctions Needham Press. Pages 544.