INTRODUCTION

At the present stage of development of dental care, patients become increasingly aware of the need to improve the quality of the restoration procedure results, and require longer life expectancy of prosthetic constructions used. It is proved that the quality and functionality of the fabricated dental prostheses are directly related to the restoration of tooth occlusal surface, which provides mastication, the main function of the dentofacial system [1,2], whereas area and relief of the masticatory surface determine efficiency of mastication in all patients [3,4]. Therefore, the efficiency of prosthetic dental treatment of patients largely depends on the unobstructed occlusal relationships to which patients are rapidly adapted. Wiskott & Belser presented in their study an overview of the development history of various occlusal patterns, and found that the desired occlusion during restoration treatment depends on the number of perfectly positioned occlusal contacts, action of functional and parafunctional forces, directed solely along tooth axis, the position of terminal transverse horizontal axis, the amplitude of lateral free movements, the dependence of tooth position on the duration of low intensity forces. Jenkelson presented research data, according to which stimulation of cranial nerves V and VII with the help of a myomonitor was determined as a method of obtaining the position of “physiological rest” of muscles that substantiated the neuromuscular position of occurrence of usual adaptive occlusion [5]. Slavichek [6], 1983, used the terms “reference position” (RP) and “deranged reference position” (DRP) instead of the terms “centric occlusion” and “adaptive centric position”. The term “reference position” (RP) defined the posterior marginal position of the lower jaw in the unloaded state of temporomandibular joint (TMJ). Reference position of TMJ with disc dislocation was defined as “deranged reference position” (DRP). Some researchers believe that there is no established "gold standard" method for recording the inter-maxillary ratio of patients [7-9]. Ideal occlusion is simultaneous occurrence of contacts in the region of adjacent teeth. It is known that such contacts are less pronounced in the frontal region, because excessive contacts during joining of anterior teeth may result in tooth loosening and an increase in interdental space. In order to optimize the distribution of masticatory load, an increase in the number of occlusal contacts in the region of buccal teeth is required, as studies showed that it is precisely in the region of lateral segments of the jaws where the maximum masticatory effort is developed, regardless of the number of such contacts. Thus, scientific and practical studies of the last century, carried out in the domain of gnathology have shown that in patients with no occlusive disorders in the position of maximum joining of teeth, an adaptive customized positioning of the jaws
with the highest possible number of antagonistic teeth contacts is provided. Also, a significant number of studies demonstrated the presence of pronounced variability among means and methods in registration of inter-maxillary occlusal interaction of antagonistic teeth, as well as the registration materials used in clinical dental practice [10], which requires special attention.

THE AIM
Clinical laboratory study of inter-maxillary relationships formation efficiency in patients in the position of maximum intercuspation (MIC) of jaws with the help of bite registration materials selected, for the improvement of quality of prosthetic treatment of patients with fixed dentures.

MATERIALS AND METHODS
Examination of 10 patients of both sexes aged 19 to 26 years, was conducted at clinical sites of the Department of Surgical and Prosthetic Dentistry of the Faculty of Postgraduate Education at Danylo Halytsky National Medical University of Lviv. Patients underwent general dental examination, and orthognathic bite, absence of dentition completeness defects and objective signs of dysfunctional changes in stomatognathic system according to the “short Hamburg test” (Ahlers H., Jakstat M., 2006) has been identified. Dental impressions of both jaws of all patients were received, their cast dental models were manufactured for laboratory study.

In order to determine clinically the results of recording inter-maxillary relationships in MIC position in patients, marking of antagonistic teeth in the lateral and frontal regions of the jaws was conducted. At this time, markers in the form of vertical complementarity lines on both sides of the dentitions under study (Fig. 1) were placed on vestibular surfaces of the first molars (along the midline of the mesial cusp 16,26), along the midline of the incisal cusp of canines 13–23 and the antagonistic premolars and central incisors (median line).

Vertical markers were immediately transferred on cast dental models according to I. Klineberg et co-work, 2015 technique. For this purpose, we applied molded ultrathin (0,1 mm) Isofolan bite splint, obtained after vacuum polymerization of the registration material, BDM index in the region of teeth 16-46 reached (0,055±0,05) mm, in the regions of teeth 26-36 it was (0,065±0,05) mm (р<0,67). At the same time, BDM value in the region of teeth 13-44 was (0,075±0,04) mm, and in the region of teeth 23-34 it made up (0,075±0,06) mm (р<1,0). Study of the region of teeth 21-31 established that the value of BDM index was within the range of (0,015±0,02) mm (Tab. I).

When using Consiflex as a registration material, the BDM index in the region of molars on the left was (0,075±0,04) mm, while BDM index in the region of molars on the left reached (0,11±0,07) mm (р<0,18). According to the results of our study, the BDM index in upper canines – lower premolars region on the right was (0,08±0,04) mm, on the left side between these pairs of antagonists the index was (0,09±0,07) mm (р<0,72). In the region of teeth 21-31, BDM index was determined within the range of (0,02±0,03) mm (Tab. I).

When using Aluwax as a registration material, the BDM index in the region of molars on the right was (0,075±0,06) mm, while BDM index in the region of molars on the right reached (0,11±0,07) mm (р<0,18). According to the results of our study, the BDM index in upper canines – lower premolars region on the right was (0,08±0,04) mm, on the left side between these pairs of antagonists the index was (0,09±0,07) mm (р<0,72). In the region of teeth 21-31, BDM index was determined within the range of (0,02±0,03) mm (Tab. I).
According to the results of our study, the BDM index in upper canines – lower premolars region on the right was \((0.13\pm0.06)\) mm, on the left side between these pairs of antagonists the index reached \((0.14\pm0.07)\) mm \((p<0.75)\). In the region of teeth 21-31, BDM index was determined within the range of \((0.045\pm0.04)\) (Tab. I).

Comparative study of BDM with the use of Futar D and Aluwax registration materials allowed to establish the absence of significant differences in the regions of teeth 16-46 \((p<0.35)\), teeth 26-36 \((p<0.11)\), teeth 13-43/44 \((p<0.79)\), teeth 23-34 \((p<0.63)\), teeth 21-31 \((p<0.18)\).

Comparison of Futar D and Consiflex registration materials applied, revealed an absence of significant differences in the regions of teeth 16-46 \((p<0.42)\), teeth 26-36 \((p<0.14)\), teeth 13-43/44 \((p<0.06)\), and teeth 23-34 \((p<0.06)\). In the region of teeth 21-31, a statistically significant intergroup difference between BDM parameters \((p^*<0.048)\) was revealed. Comparative study of BDM indices with the use of Consiflex and Aluwax registration materials allowed to establish the absence of significant differences in the regions of teeth 16-46 \((p<1.0)\), teeth 26-36 \((p<1.0)\), teeth 13-43/44 \((p>0.08)\), teeth 23-34 \((p<0.18)\), teeth 21-31 \((p<0.10)\).

During the laboratory study of cast dental models of 10 patients, it was found in MIC position that with the use of Futar D registration material, the BDM index in the region of teeth 16-46 was \((0.06\pm0.05)\) mm, and in the region of teeth 26-36 it reached \((0.07\pm0.05)\) mm \((p<0.64)\). At the same time, the BDM index in the region of teeth 13-44 was \((0.085\pm0.03)\) mm and, respectively, in the region of teeth 23-34 it reached \((0.085\pm0.05)\) mm \((p<1.0)\). In the region of teeth 21-31, the BDM index amounted to \((0.015\pm0.02)\) (Tab. II).

BDM index on cast dental models using Aluwax reached \((0.085\pm0.03)\) mm in the region of molars on the right, and
We believe that the demonstrated statistical review of BDM indices requires further in-depth study by way of increasing the number of clinical studies of spatial characteristic of maximum intercuspation position, the habitual occlusion of patients with intact dentitions, as a representational tool for an appropriate assessment of modern registration materials.

**CONCLUSIONS**

1. **Clinical intergroup research** with the use of Futar D and Consiflex registration materials in the region of antagonistic teeth 21-31 found the presence of significant representational difference ($p^*<0.048$) between BDM indices, what should be taken into account during clinical monitoring of complementarity of inter-maxillary relationships with the use of the registration biomaterials under study.

2. **Laboratory intergroup research** with the use of Futar D and Consiflex registration materials in the region of antagonistic teeth 13-43/44, 23-34, 21-31 found the presence of significant representational difference ($p^*<0.01$), ($p^*<0.01$), ($p^*<0.02$); presence of significant representational difference ($p^*<0.04$) was established with the use of Futar D and Aluwax registration materials in the region of antagonistic teeth 26-36; presence of significant representational difference ($p^*<0.03$), ($p^*<0.04$) between BDM indices was found with the use of Consiflex and Aluwax registration materials in the region of antagonistic teeth 13-43/44, 21-31, what should be taken into account during clinical monitoring of complementarity of inter-maxillary relationships with the use of the registration biomaterials under study.

3. It was found that in the clinical study of patients with intact dentitions with the use of Futar D registration material, a lower optimum (lower limit – 0.015 mm, (0.12±0.05) mm ($p<0.10$) in the region of molars on the left. According to the results of our research, BDM index in upper canines – lower premolars region on the right reached (0.09±0.04) mm, while it reached (0.10±0.06) mm ($p<0.67$) between these pairs of antagonistic teeth on the left side. In the region of teeth 21-31, BDM value is determined within the range of (0.02±0.03) mm (Tab. II).

BDM index on cast dental models using Consiflex registration material reached (0.085±0.05) mm in the region of molars on the right, and (0.12±0.06) mm ($p<0.18$) in the region of molars on the left. According to the results of our research, BDM index in upper canines – lower premolars region on the right reached (0.14±0.05) mm, while it reached (0.15±0.05) mm ($p<0.67$) between these pairs of antagonistic teeth on the left side. BDM index value in the region of teeth 21-31 was (0.05±0.03) mm (Tab. II).

Comparative study of BDM with the use of Futar D and Aluwax registration materials allowed to establish the absence of significant differences in the regions of teeth 16-46 ($p<0.18$), teeth 13-43/44 ($p<0.76$), teeth 23-34 ($p<0.57$), teeth 21-31 ($p<0.66$). Presence of significant intergroup difference of BDM parameters ($p^*<0.04$) was found only in comparison group in the region of teeth 26-36.

Comparison of BDM indices during application of Futar D and Consiflex registration materials, revealed an absence of significant differences in the regions of teeth 16-46 ($p<0.25$), teeth 26-36 ($p<0.06$). Presence of significant intergroup difference in BDM parameters was found, however, in comparison group in the regions of teeth 13-43/44 ($p^*<0.01$), teeth 23-34 ($p^*<0.01$), and teeth 21-31 ($p^*<0.02$).

Comparative study of BDM indices with the use of Consiflex and Aluwax registration materials allowed to establish the absence of significant differences in the regions of teeth 16-46 ($p<1.0$), teeth 26-36 ($p<1.0$), teeth 23-34 ($p<0.07$). Presence of significant intergroup difference in BDM parameters was found in comparison group in the regions of teeth 13-43/44 ($p^*<0.04$) and teeth 21-31 ($p^*<0.04$).
upper limit – 0.075 mm) of differences between BDM indices was observed, indicating a better complementarity during recording the maximum intercuspation of this material in comparison with Consiflex (lower limit – 0.045 mm, upper limit – 0.135 mm) and Aluwax (lower limit – 0.020 mm, upper limit – 0.11 mm).

4. It was found that in the laboratory study of patients with intact dentitions with the use of Futar D registration material, a lower optimum (lower limit – 0.015 mm, upper limit – 0.085 mm) of differences between BDM indices was observed, indicating a better complementarity during recording the maximum intercuspation of this material in comparison with Consiflex (lower limit – 0.05 mm, upper limit – 0.15 mm) and Aluwax (lower limit – 0.02 mm, upper limit – 0.12 mm).

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CORRESPONDING AUTHOR
Taras R. Hlushko
Danylo Halutsky National Medical University
82 Sakharova street, office 2, Lviv, 79026, Ukraine
tel: +380971260872
e-mail: taras_hlushko@hotmail.com

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