Prosthetic Treatment Optimization with the use of All-Ceramic Constructions under Synchroelectromyography Method Supervision

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Abstract

Objective of present study was dedicated to the evaluation of effectiveness regarding prosthetic treatment optimization with the use of all-ceramic restorations based on synchroelectromyography method supervision. Due to the used inclusion and exclusion criteria study cohort was formed with 61 patients.

Rehabilitation of study and control groups was held with the use of all-ceramic restorations by analogical protocols, except control group didn't receive any EMG-control at the stages of primary diagnostics, composite mock-up correction and final crown/FPD fixation. Mean clinical success levels of all-ceramic crowns/FPD after 1 year of service in both study and control group outreached 90%. Mock-up correction of 3 teeth dentition defects based on registered EMG-values was associated with statistically significant differences of all EMG-indexes while comparing such at the moment of mock-up fixation and at the moment of reaching relative masticatory muscles balance ($p < 0.05$). No statistically approved linear correlation was noted regarding fact of ceramic chipping or fracture occurrence and fact of using EMG-controlling approach, while correlation was noted regarding length of dentition defect and fact of ceramic chipping (considering 3 teeth dentition defect – $r=0.46$, $p < 0.05$). Patients who received appropriate EMG-diagnostics were characterized with less frequent ceramic chipping and fractures compare to patients who were rehabilitated without the use of EMG-control (even though registered difference was not statistically significant), and with higher satisfaction of received crown/FPD service regarding duration of subjective adaptation to the crown ($p < 0.05$) and fact of reaching full adaptation demands ($p < 0.05$).

Use of EMG-control approach could be recommended as preventive regarding biomechanical prognosis of all-ceramic restorations placed on posterior teeth, and as optimal for faster subjective adaptation of the patients to the received prosthetic constructions.

Experimental article (J Int Dent Med Res 2021; 14(1): 24-32)

Keywords: All-ceramic restorations, electromyography, adaptation, success.

Received date: 09 November 2020   **Accept date:** 22 December 2020

Introduction

Control above obtained results of prosthetic rehabilitation during long-term monitoring tends for timely identification and prevention of possible risks with resolution of occurred complications before they provoke irreversible consequences.[1,2,3,4,5] Manifestations of occlusal scheme changes associated with its alterations include chipping and fracture of present restorations and prosthodontic constructions, TMJ-related symptoms, subjective pain feelings and discomfort during function.[6,7,8,9,10] Prophylaxis of such includes various prosthetic treatment protocols with prior detailed occlusal analysis and stomatognathic system equilibration considering future occlusal scheme that could be used for outcome rehabilitation.[6,7,8] Taking into account that maxillofacial region represents complex biomechanical structure with various functional and structural interrelations, evaluation of planned treatment protocol should be provided at different organization levels including parameters of individual tooth, dentitions, occlusal interactions, balanced muscle activity and adequate TMJ performance.[1,3,7,8] Nevertheless, there is a lack of universal diagnostic

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methodologies or approaches aimed at the stability control of stomatognathic system during preparation phases for prosthetic rehabilitation and afterwards during short- and long-term monitoring that should support patient during period of adaptation.

Provided overview and meta-analysis argumented practical potential of electromyography (EMG) method within dental field not only for monitoring or observational objective, but also for active diagnostic and treatment manipulations.[11] On the other hand, electromyography represents a novel method that prospectively could enrich evidence database in respect to outcomes obtained after different prosthetic treatment protocols and algorithms. Moreover, Ferrario et al. noted that surface electromyography method potentially could be used for prior differentiation of stomatognathic system alterations that associated with subjectively analogical symptoms.[11] This way authors proposed to separate the patients with a temporomandibular joint disorders and patients with a neck pain problems based on the results of summed muscles activity and symmetric muscle potentials.[11]

Relevant literature data dedicated to the aspects of muscle activity parameters registration during different rehabilitation protocols mostly focused on the assessment of masseter and anterior temporal muscles functioning before and after provided implantation or prosthetic treatment, while the lack of information has been noted considering impact of registered muscle activity on the success prognosis of provided treatment approach[12,13,14,15,16]. Nevertheless, specific changes of EMG-parameters have been noted considering not only using different types of prosthetic constructions, but also while forming various occlusal schemes during long-term prosthetic rehabilitation.[17] That is why it is logical to suggest, that control of preparation phase for future rehabilitation and screening of patients' functional adaptation regarding formed occlusal pattern with the use of EMG-methods could provide prospective support for complex diagnostic and prosthodontic treatment algorithms.

Masticatory muscles represent unique biomechanical structures due to their unrivalled relationship both with occlusion parameters and TMJ performance.[1,2,5,13,17] Number of occlusion theories relies on masticatory muscles contribution with different manner of their impact, while none of them discount their role in forming integral component of dental occlusion. Control of several muscles' parameters, such as activity level, symmetry of function and contraction potentially could be used as preventive strategy regarding prevalence of biomechanical complication among all-ceramic types of prosthetic restorations, which based on previous studies could be categorized as chipping and fracture sensitive.[8,10,15]

Considering all above-mentioned facts objective of present study was dedicated to the evaluation of effectiveness regarding prosthetic treatment optimization with the use of all-ceramic restorations based on synchroelectromyography method supervision.

Materials and methods

Design of the study was clinically oriented and included retrospective analysis of provided prosthetic treatment success among study and control groups respectively, which differed by the obtained diagnostic and planning protocol during the course of rehabilitation.

Primary study cohort was formed out of number of dental patients intended Dental Medical Center (Kyiv, Ukraine) with the objective of prosthetic treatment due to the present unilateral tooth crown or partial dentition defect in distal regions of jaws. The next inclusion criteria were used for primary cohort formation: 1) unilateral tooth crown defect or partial dentition defect localized in the distal jaw regions (premolar or molar); 2) age of patient above 18 years (for possibility to sign informed consent form under personal agreement to participate in the study); 3) structural, biomechanical and functional conditions that support the use of fixed all-ceramic constructions for crown or partial dentition defect restoration; 4) maximum length of dentition defect of no more than 3 teeth including abutment teeth; 5) no need of prosthodontic mesoctructure use, such as post-and-core; 6) absence of diagnosed parafunctions; 7) absence of any background or active comorbidity that restricts the use of all needed supplements (anesthesia, retraction cord, coffer-dam) or compromise the prognosis of fixed all-ceramic restorations; 8) lack of any significant periodontal pathologies that compromise the
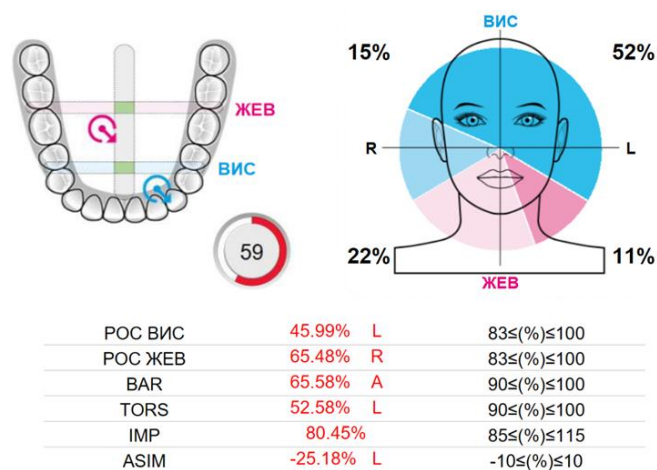
functional prognosis of dental status due to the obtained perio-chart results; 9) personal agreement to take part in the study with correspondence to all ethical aspects and anonymization principles evidenced by signed informed consent form. Exclusion criteria were formulated as following: 1) age of person below 18 years; 2) tooth crown defect that argument the need of post-and-core restoration use; 3) dentition defect with planning length of more than 3 teeth including abutment ones; 4) bilateral tooth crown or dentition defect; 5) frontal localization of present tooth crown or dentition defect (in the area of central incisors, lateral incisors and canines); 6) presence of clinically-diagnosed or anamnestic-proved parafunctions; 7) presence of allergies, adjacent pathological conditions or somatopathologies that excludes possibility to realize protocol of tooth preparation, impression obtainment and crown/bridge fixation. Due to the used inclusion and exclusion criteria study cohort was formed with 61 patients.

61 subjects were randomly allocated into study (30 patients) and control (31 patients) groups.

Tooth preparation, taking-off impressions and crown fixation were held due to the generally accepted protocols analogically in study and control groups.[20,21] All single crowns and fixed partial prostheses were made of VITA In-Ceram ALUMINA material (Vita Zahnfabrik. Germany). Protocol of study group prosthetic rehabilitation was next: 1) registration of EMG-parameters prior to any prosthetic intervention; 2) impressions obtaining for direct provisional crown manufacturing by analog method; 3) tooth preparation under anesthetic cover and further gum retraction; 4) impression obtaining for cast formation by analog method; 5) fixation of direct provisional crowns made of two-component composite material with appropriate occlusal correction; 6) change of direct provisional crown(s) on composite mock-up manufactured in dental laboratory; 7) registration of EMG-parameters with the use of surface synchroelectromyography device; 8) direct correction of composite mock-up considering registered EMG-parameters; 9) transfer of corrected mock-up into the dental laboratory for the use as a referent during final crown/fixed partial denture (FPD) manufacturing; 10) final crown/FPD fixation with control of EMG-parameters.

Control group of patients were treated due to the analogical protocol, except excluding stage 1 and 7, and stages 8 and 10 did not included use of EMG-device (correction of composite mock-up was held using articulating paper and subjective feelings of patients, while analogical approach was used for the control purpose at the stage 10).

Registration of electromyographical parameters was held with the use of Teethan device (BTS S.p.A.,Garbagnate Milanese) due to the algorithm described in previous study by registering following parameters: POC-index – for the assessment of symmetry of contraction within homological pair of masticatory muscles; BAR-index – for the evaluation of occlusal barycenter location; TORS-index – for the evaluation of mandible torsion within horizontal plane; IMPACT-index – for the evaluation of muscle activity; ASIM-index – for the evaluation of asymmetry levels between muscles of left and right sides (Figure 1).[4]

РОС ВИС	45.99%	L	83≤(%)≤100
РОС ЖЕВ	65.48%	R	83≤(%)≤100
BAR	65.58%	A	90≤(%)≤100
TORS	52.58%	L	90≤(%)≤100
IMP	80.45%		85≤(%)≤115
ASIM	-25.18%	L	-10≤(%)≤10

*the parameters highlighted in red indicate values outside the normal range

Figure 1. Examples of diagnostic reports obtained with surface synchroelectromyography method.

Stage 8 in the protocol of study group rehabilitation (direct correction of composite mock-up considering registered EMG-parameters) was aimed either at the normalization of EMG-parameters due to the normal range, or to their approximation to EMG-values registered at stage 1, which characterized patient's habitual occlusal-muscular pattern.

Final evaluation of clinical performance of all-ceramic crowns and FPD was held by using adapted CDA criteria after 12 months of being in function.[22,23]

Patients satisfaction with provided crown/FPD was evaluated using adapted form of questionnaire, which included questions regarding: the subjective perception of crown/FPD service, subjective perception of outcome esthetics, subjective perception of outcome functions, subjective perception of outcome adaptation to the crown regarding fulfillment of adaptation demands and needed period for adaptation, subjective perception of outcome speech function, and subjective perception of possibility to provide adequate hygienic cleaning in the area of placed crown/FPD. Satisfaction levels regarding each subjective perception were rated personally by patients due to the next scale: 3 – high satisfaction, 2 – moderate satisfaction, 1 – low satisfaction.

The study protocol was fully approved and affirmed for realization by the Ethical Review Committee of Bogomolets National Medical University, Dental Medical Center (Kyiv, Ukraine).

Primary distribution of patients considering age, gender, length of dentition defect and defect localization was carried out using descriptive statistics methods. Linear regression method was used to model potential interrelations between ceramic chipping or fracture and fact of using EMG-controlling approach. Significance of statistical difference considering CDA clinical success level and its derivates between study and control groups was calculated using Student's t-test. Coefficient of correlation was used to interpret relationships between such variables as age, gender, length of dentition defect and defect localization with outcome result of crown/FPD clinical success.[24,25] All statistical processing procedures were held within GNU PSPP (GNU Project, Free Software Foundation, Inc.).

Results

Distribution of patients included in study and control groups respectively represented in Table 1. No statistical difference regarding distribution pattern of patients considering criteria of age and gender was noted between study and control group, while in both groups amount of female subjects was statistically higher compare to the amount of male subjects ($p < 0.05$).

	Study group	Control Group
Age range		
21-25 years	7 (23.33%)	8 (25.81%)
26-30 years	4 (13.33%)	5 (16.13%)
31-35 years	5 (16.67%)	4 (12.90%)
36-40 years	7 (23.33%)	8 (25.81%)
41-45 years	7 (23.33%)	6 (19.35%)
Gender		
Male	12 (40.0%)	15 (48.39%)
Female	18 (60.0%)	16 (51.61%)

Table 1. Distribution of patients within study and control groups considering parameters of age and gender.

Both study and control group demonstrated major prevalence of 2 teeth dentition defect (40.0% and 38.71% respectively), while 1 tooth dentition defect and 3 teeth dentition defects were characterized with relatively analogical prevalence in the range of 29.03-32.26%.

In study group distribution of dentition defects regarding their topography was equal among mandible and maxilla, while in control group most defects were located at mandible (Table 2).

Study group	1 tooth defect	2 teeth defect	3 teeth defect
Mandible	4 (13.33%)	5 (16.67%)	6 (20.0%)
Maxilla	5 (16.67%)	7 (23.33%)	3 (10.0%)
Control group	1 tooth defect	2 teeth defect	3 teeth defect
Mandible	6 (19.35%)	8 (25.81%)	6 (19.35%)
Maxilla	3 (9.68%)	4 (12.90%)	4 (12.90%)

Table 2. Distribution of patients within study and control groups considering length of dentition defect and topography of the defect.

During the correction of EMG-parameters at the stage of composite mock-up fixation it was noted that in cases of 1 tooth defect no statistically significant changes were registered considering situation before mock-up correction and after its correction in respect to EMG-values, while in cases of 2 teeth dentition defect POC-index ($p < 0.05$) and IMPACT-index ($p < 0.05$) demonstrated valuable pattern of changes before and after composite mock-up correction provided based on myographical criteria. Mock-up correction of 3 teeth dentition defect based on registered EMG-values was characterized with statistically significant differences of all EMG-indexes while comparing such at the moment of mock-up fixation and at the moment of reaching

relative masticatory muscles balance (Table 3).

Study group	1 tooth defect	2 teeth defect	3 teeth defect
POC-index	p > 0.05	p < 0.05	p < 0.05
BAR-index	p > 0.05	p > 0.05	p < 0.05
TORS-index	p > 0.05	p > 0.05	p < 0.05
IMPACT-index	p > 0.05	p < 0.05	p < 0.05
ASIM-index	p > 0.05	p > 0.05	p < 0.05

Table 3. Significance of changes registered among EMG-values before and after correction of composite mock-up.

After 1 year of all-ceramic crowns/FPD service both study and control group were characterized with high level of their clinical success based on obtained results of adapted CDA criteria. No statistical difference was noted between study and control group regarding color match (p > 0.05), surface (p > 0.05), marginal discoloration (p > 0.05), marginal integrity (p > 0.05), ceramic chipping (p > 0.05) and ceramic fracture (p > 0.05), while only regarding "C" evaluation criteria (ceramic chipping with possible further reparation) of ceramic chipping statistically approved difference was registered between study and control group (p < 0.05). Mean clinical success levels of all-ceramic crowns/FPD after 1 year of service in both study and control groups outreached 90% (Table 4).

Criteria/ Parameters	A Study group	A Control group	B Study group	B Control group	C Study group	C Control group	D Study group	D Control group
Color match	29 (93.33%)	28 (90.32%)	2 (6.67%)	3 (9.69%)	-	-	-	-
Surface	29 (96.67%)	30 (96.77%)	1 (3.34%)	1 (3.22%)	-	-	-	-
Marginal discoloration	29 (96.67%)	29 (93.54%)	1 (3.34%)	2 (6.45%)	-	-	-	-
Marginal integrity	29 (96.67%)	29 (93.54%)	1 (3.34%)	2 (6.45%)	-	-	-	-
Ceramic chipping	29 (93.33%)	28 (87.09%)	2 (6.67%)	2 (6.45%)	-	2 (6.45%)	-	-
Ceramic fracture	29 (96.67%)	29 (93.54%)	-	-	-	-	1 (3.34%)	2 (6.45%)
Difference considering mean values of each criteria	p > 0.05		p > 0.05		p < 0.05		p > 0.05	

Table 4. Distribution of clinical success parameters within study and control groups after 1 year of crowns/FPD service.

Specific situation was noted regarding patients' personal satisfaction with all-ceramic crowns/FPD service: results obtained by subjective perception of service, esthetics, function, speech and ability to provide needed hygienic care were analogical between study and control groups. Nevertheless, patients of study group reported to have shorter period of needed adaptation for the fixed prosthetics and higher level of fulfilling individual subjective adaptational demands (Table 5).

Parameters of patients' satisfaction	Study group M±m	Control group M±m	p-value
Subjective perception of crown/FPD service	2.54±0.41	2.42±0.47	p > 0.05
Subjective perception of outcome esthetics	2.73±0.18	2.76±0.15	p > 0.05
Subjective perception of outcome functions	2.60±0.31	2.25±0.46	p > 0.05
Subjective perception of fulfilling adaptation demands	2.78±0.15	2.13±0.23	p < 0.05
Subjective perception of needed period for adaptation	4.25±1.19*	8.19±1.10*	p < 0.05
Subjective perception of outcome speech function	2.69±0.22	2.72±0.21	p > 0.05
Subjective perception of possibility to provide adequate hygienic care	2.75±0.19	2.63±0.27	p > 0.05

Table 5. Satisfaction of patients regarding crown/FPD service after 1 year. *accounted in days.

No statistically approved linear correlation was noted regarding fact of ceramic chipping or fracture occurrence and fact of using EMG-controlling approach, while significant correlation was noted regarding length of dentition defect and fact of ceramic chipping (considering 3 teeth dentition defect – r=0.46, p < 0.05). Registered interrelations between age, gender, defect topography and ceramic chipping/fracture were not statistically validated (p > 0.05).

Discussion

Outcome of any prosthetic dental treatment aimed not only at the establishing correct functional and esthetic profile, which could be observed during clinical examination, but also at forming appropriate occlusal scheme, which in turn should be supported with corresponding adequate muscle interaction pattern. Initial reaction of muscles on provided prosthetic interventions could be characterized with various type of manifestations, tendency of which differs at different monitoring periods. Nevertheless, Sierpinska et al. noted that temporal and masseter muscles right after the prosthetic treatment of tooth wear demonstrated some decreased of activity, while further long-term levels of activity were increased compare to those registered before the treatment.[26] Such type of response was categorized as optimal for patients with restored vertical occlusal height.[26,27,28] Moreover, authors noted that point type of occlusal contacts are preferable for muscle activity increase compare to flat occlusal type of contacts.[26,27]

In provided study which included prosthetic rehabilitation of dental patients with all-

ceramic crowns and fixed partial dentures in the area of distal unilateral partial dentition defects we have noted that despite the use of surface synchroelectromyography method as controlling one, both groups of patients demonstrated high level of crowns/FPDs clinical success that exceeds 90% after 1 year of service. Nevertheless, control group for which no EMG-control approach was provided demonstrated higher prevalence regarding ceramic chipping and ceramic fracture.

In systematic review of Pjetursson B.E. and colleagues it was noted that all-ceramic multiple-unit FPDs characterized with 89.1% survival for reinforced glass ceramic FPDs and with 86.2% for glass infiltrated aluminia FPDs after 5 years of function.[25] Level of ceramic fracture prevalence within all analyzed studies was 1.03-1.36% which is lower, compare to results obtained in our study.[25] Such difference could be provoked by the various amounts of the study samples. Nevertheless, prevalence of ceramic chipping in meta-analysis (1.07-7.55%) was analogical to such reported in our study.[29] Pooled posterior crowns failure rate reported in Kassadjian V. et al meta-analyses reached 9.1% during 36-223 months of monitoring.[30] In literature review of Della Bona A. et al. all-ceramic three units fixed partial dentures demonstrated 67.3-100% survival rate during various monitoring periods.[31] In systematic review researches reported higher rate of ceramic chipping within all-ceramic FPDs, which reached 13.6% after 5 years of service,[9] while meta-analysis of just randomized controlled studies shown that occurrence of ceramic chipping among all-ceramic FPD seems to be higher compare to metal-ceramic FPD.[32] 5-year observation provided by Pott P.-C. et al. demonstrated 94% clinical success of modern all-ceramic FPD, while registered 2.4% ceramic chipping could be corrected by intraoral polishing.[23]

In previously provided study of Beraj et al., authors noted that adequate prosthetic treatment of dental patients with limited unilateral defects of dentition supports the improvement of masseter and anterior temporalis muscles activity, while changes of such activity and muscular symmetry considered to be significant while monitoring them before and after prosthodontic rehabilitation.[33] Kostiuk T.M. et al. also noted signs of masticatory muscles activity modulation during dental patients' treatment with the use of fixed types of prostheses.[34] Analogical outcome we have noted in our study just considering patients with diagnosed 3 teeth dentition defects: changes of POC-index, BAR-index, TORS-index, IMPACT-index and ASIM-index were statistically significant while comparing their values before composite mock-up correction and afterwards at the stage of final crown/FPD fixation. Such outcomes could be interpreted as improvement of muscle-occlusion balance with normalization of its pattern to the targeted norm ranges or to the condition registered before any iatrogenic interventions. However, changes analogical to above-mentioned regarding EMG-values were not noted at the study group patients with 1 tooth- or 2 teeth-dentition defects: changes of EMG-values registered before mock-up correction and after final crown/FPD fixation were not statistically approved. Such results could be argumented by the fact that such short unilateral defects could be fully functionally compensated by the stomatognathic system to some certain time point, and such compensation negotiate alterations of the masticatory muscles functions. Such hypothesis is also supported by the used inclusion and exclusion criteria, since relatively young patients with well-developed compensation capabilities were included in the study, only patients with short dentition defects were presented as study subjects, and primary we excluded subjects with allied somatopathologies and parafunctions. Due to the registered trend of EMG-changes manifestations with the increase of dentition defect length, we could presume that patients with dentition defects of 3 and more teeth demonstrate marked disbalance of stomatognathic system that could benefit from provided EMG-control with the objective of reaching stable functional condition and improve prognosis of provided prosthetic rehabilitation.

Iatrogenic interventions, such as prosthetic rehabilitation with the use of zygomatic implants, provoke hyperactivity conditions of masticatory muscles compare to the activity status of such muscles during fully vital conditions of dentitions.[35] Nevertheless, such muscular activity increase could not be categorized as pathological, since upgrowth involvement of muscles elements potentially could be associated with the purpose to reach masticatory pattern analogical to such registered

during normal dentition conditions.

In previous clinical study it was noted that prosthetic rehabilitation with fixed type of restorations and predominant posteriorly localized occlusal contacts characterized with increased jaw-muscle activity registered with electromyography method regardless of forming canine-guided or group function occlusion scheme.[17] Authors associated noted increase of chewing muscles activity with the formation of new neuromuscular pattern after corresponding dental interventions and restoring the integrity of dentitions with fixed prosthetic restorations.[17] On the other hand, it was found that canine guidance scheme characterized with lower level of muscle contraction both within natural dentition and within fixed prosthetics on implants, which makes it preferable for total prosthetic reconstruction cases.[36] In number of studies electromyography method have been described as controlling considering patient adaption to different kind of dental prosthetics. Manzotti et al. stated that the use of surface electromyography methods could potentially support equilibration of stomatognathic system while modifying the activity of masticatory muscles through osteopathic manipulations.[37] Shala et al. even have verified bioelectric activity of masseter and temporalis muscles as prominent indicators of patients' functional adaptation to the provided prosthetic rehabilitation.[38] Changes within bioelectric activity of masseter and temporalis muscles could represent a trend of stomatognathic system restabilization compare to the initial situation prior any treatment manipulation.

Researches previously described electromyography combined use with quality of life and satisfaction with treatment criteria to establish advantages of various treatment methods and objective changes occurring within stomatognathic system during short- and long-term post-treatment monitoring.[39] In our study we have discovered high level of patients' satisfaction regarding obtained outcome of prosthetic treatment with the use of all-ceramic types of restoration. Moreover, use of EMG-control approach supported faster patients' adaptation to the fixed restoration and complete fulfillment of patients' adaptation demands by the results of subjective perception questionnaire.

In the study of Tecco et al., in which researches used the same Teethan device for surface electromyography procedure, it was found that both digital and analog mock-up production technique are characterized with the same effectiveness regarding prosthetic rehabilitation efficiency.[4] Analogically in our study we have noticed that use of conventional mock-up does not compromise the end results of prosthetic rehabilitation with the use of all-ceramic restorations. Bianco E. described a clinical case with vertical posterior dimension restoration while using electromyographical parameters to control occlusal load and avoid overload consequences.[40] In our study we used analogical approach to normalize occlusal distribution and muscle impact over all elements of dentition while excluding zones of increased masticatory strain out of fixed all-ceramic restorations.

Limitations of provided study associated with its post hoc analysis type and relatively small sample size, but despite this it was possible to organize balanced between groups conditions regarding income parameters of patients' distribution by the age, gender and dentition defect length. Moreover, despite small size of the study and control groups, no dropouts were registered during all period of monitoring, thus forming favorable condition for comparative analysis and adequate conclusion formulation. Considering limitations of the research its further perspective will be dedicated to the analysis of greater study cohort within prospective study design with formulating antecedent hypothesis regarding influence of EMG-control on prognosed prosthetic rehabilitation success with the use of all-ceramic restorations.

Conclusions

Due to the limitations of provided study considering its retrospective design and relatively restricted study cohort, it could be concluded that all-ceramic crowns and fixed partial dentures characterized with high level of clinical service, which exceeds 90% during 12 months of monitoring regardless the fact of using or not EMG-approach for the control aim during rehabilitation protocol. Meanwhile, patients who received appropriate EMG-diagnostics were characterized with less frequent ceramic chipping and fractures compare to patients who were rehabilitated without the use of EMG-control (even though registered difference was not

statistically significant), and with higher satisfaction of received crown/FPD service regarding duration of subjective adaptation to the crown (p < 0.05) and fact of reaching full adaptation demands (p < 0.05). Use of EMG-control approach could be recommended as preventive regarding biomechanical prognosis of all-ceramic restorations placed on posterior teeth, and as optimal for faster subjective adaptation of the patients to the received prosthetic constructions.

Declaration of Interest

The authors report no conflict of interest.

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