THE EFFECT OF THE DIRECT COMPOSITE VENEERS RESTORATIONS ON THE MICROBIAL STATUS OF ORAL CAVITY

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Abstract

The purpose of our research was to find out microbiological status of oral mucosa before and after veneering and the relation of bacterial complications of veneering with initial features of oral cavity, with general state of an organism, with social-biological factors and with bad habits.

Keywords: Oral cavity, veneer, bacterial, microbial

Methods

65 patients from the contingent of Ivane Javakhishvili Tbilisi State University basic dental clinic, who have undergone veneering with composite material of the firm “Estelite Sigma Quick” (Manufactured by Tokuyama Dental Corporation, Japan) were prospectively studied by us. Our study was nonrandomized. We investigated the patients with the necessity of veneering, who answered the requirements of inclusion and exclusion criteria.

Among them 41 were females and 24 - males of average age 33.5 years. We studied the following factors: gender, age, hygienic habits, addictions, environmental factors, concomitant diseases, mucous membrane traumas, nutrition type, dietary habits, occlusion types, oral cavity diseases,

indexes, subsequent complications following veneering. Bacteriological research was conducted before veneering and after 3 weeks. Statistical support was provided by using the program package SPSS 11-5.

Results

Bacterial contamination of oral cavity before veneering shows reliable positive correlation with the following factors: excessive sugar intake, decompensated caries, relapsing caries, discoloration of restoration appearing of demarcation line, revealing of pathological microflora, existence of an old damaged veneer. Significant decrease of bacterial contamination was seen after veneering. Particularly decrease in levels of Streptococcus mutans, Streptococcus sanguinis, Stenotrophomonas maltophilia and Porphyromonas gingivalis can be pointed out. The patients with old damaged veneers, exhibited high levels of Streptococcus mutans, Streptococcus mitis, Porphyrimonas gingivalis, Stenotrophomonas maltophilia, Klebsiela pneumoniae.

Conclusion

Oral cavity bacterial status showed significant association with general state of oral cavity and organism. Existence of old damaged veneer influences microbial contamination of oral cavity; after veneering bacterial status of oral cavity improves.

Introduction

Selection of cosmetic coating of teeth is of great importance in prosthetic dentistry [1]. Veneering was stated as less aggressive treatment [2]. Among factors influencing successful veneering, diagnostic approaches, correct selection of contingent, appropriative preparation of tooth and procedure of adhesive attachment are pointed out [3; 4]. There are multiple advantages of veneering: 1. Cosmetic values; 2. Very conservative treatment in relation to dental tissues; 3. Price point; 4. Applied within one dental visit; 5. Cam be repaired if damaged. But in some cases veneering may become

provocative factor for pathological process of oral cavity, especially at the time of improper state of oral mucous membrane [5, 6, 7]. Local flora of oral cavity plays the significant role in people's health. Microbial contaminations are often in relation with hygienic habits. It participates in the development of the immune system and provides resistance towards colonization by pathogenic microorganisms [9].

The purpose of our research was to find out microbiological status of oral cavity mucous membrane before and after veneering and correlation of bacterial contamination with the general state of an organism, with social-biological factors and with bad habits.

Materials and Methods

Approval of the clinical study was given by the Ethical Committee of Ivane Javakhishvili Tbilisi State University. We investigated 65 patients who have undergone veneering with composite resin "Estelite Sigma Quick" (Tokuyama Dental Corporation, Japan).

Patients' written consent to the trial was obtained after having provided a complete explanation of the aim of the study.

Age groups - > 20-9 patients, 20-40 – 35 patients, 40-60 – 17 patients, <60 – 2 patients.

The number of patients, who had not had primary veneers were 37; and those who had had old damaged veneers (secondary caries, marginal discoloration, marginal integrity, fracture of restoration (veneer) , discoloration of veneer) were - 28.

Inclusion Criteria: Age > 18 years. Written consent of the patients with the necessity of veneering who answered the requirements of inclusion and exclusion criteria.

Exclusion Criteria: Diabetes, autoimmune diseases, severe form of parodontosis; known pregnancy; disabilities; deep carious defects (close to

pulp, < 1mm distance) or pulp capping; heavy occlusal contacts or history of bruxism; systemic disease or severe medical complications; xerostomia.

Bacteriological study was conducted before veneering and 3 weeks after it. Isolation of organizms was performed with conventional media. Isolates of oral specimens were tested on the VITEK 2 system and API identification system. Susceptibility testing for these isolates was performed on the VITEK2 system and by Kirby Bauer disk diffusion method. Minimal inhibitory concentrations (MICs) were interpreted according to the CLSI antimicrobial susceptibility guideline.

With the purpose of defining association between oral cavity microbial status and general state of the organism, we studied the patients' data and characteristics according to the following questionnaire form. Questionnaire includes following factors: Gender, Age, Hygienic habits, Addictions, Environment factors, Mucous membrane traumas, Nutrition type, Dietary habits, Concomitant diseases, Occlusion, Oral cavity diseases, Hygienic Index PI, PMA Index, Complications after veneering.

Every factor may have the definite importance (1-yes, 0-not).

Hygienic index characteristics were compared in accordance with mean values as well as their frequency owing to which coding of factors was carried out. [10]

Table 1 Hygienic index characteristics

Hygienic index [11]	Evaluation	State	code
	1,1 - 1,5	Good	1
	1,6 - 2	Satisfactory	2
	2,1 - 2,5	unsatisfactory	3
	2,6 – 3,4	Bad	4
	3,5 - 5	very bad	5
PI	0,1 - 1	healthy gum	1
	1 - 2	initial shape	2
	2 - 3,5	Moderate	3
	> 3,5	Severe	4
PMA index (%)	<30		1
	30 - 60		2
	> 60		3

In order to define qualitative index, we were counting average frequency and we provided evaluation of group differentiation by means of F criterion, as for the patient`s frequencies before and after veneering, we identified them in accordance with Wilcoxon ranks test. In order to ascertain interconnections between parameters, Spearmen g correlation analysis was conducted with 95% reliability probability of reliability represents $p<0,05$[11].Statistical support was provided by means of the program package SPSS 11-5.

Results

Among the patients who needed veneering, the microbe was sown out before veneering in 49 patients ($0,75\pm0,447$), among them associations were revealed in 15 cases, in particular – 3 cases of Candida albicans + Streptococcus mutans, 3 cases of Streptococcus mutans + Stenotrophomonas maltophilia, 4 cases of Streptococcus sanguinis + Streptococcus mutans, 1 case of Streptococcus mutans + Stenotrophomonas maltophilia + Porphyromonas gingivalis, 1 case of Streptococcus sanguinis + Prevotella intermedia, 1 case of Streptococcus mutans + Porphyromonas gingivalis, 1 case of Streptococcus salivarius+Streptococcus mutans.

Statistical Evaluation of Oral Cavity Characteristics According to Microbe Colonization

Bacterial contamination of oral cavity depends on a patient's lifestyle. In the patients' group who were sown out a microbe, was reliably increased: mainly carbohydrate nutrition type respectively $0,31\pm0,479$ and $0,59\pm0,497$ ($p<0,05$), excessive sugar intake respectively $0,25\pm0,447$ and $0,55\pm0,503$($p<0,0368$), Direct occlusion, respectively $0,38\pm0,500$ and $0,14\pm0,354$, ($P<0,0446$), Decompensated caries, respectively $0,06\pm0,250$ and $0,31\pm0,466$ ($p<0,05$).

In the above mentioned group decompensated caries, discoloration of filling was reliably high. Relapsing caries may be authentically developed more frequently.

At the next stage of the given research we studied bacterial contamination before and after veneering (Table 2)

Table 2 Bacterial Contamination Before and After Veneering (n = 65)

Name of Factors	Before veneering			After veneering			
	n	M	Std	n	M	Std	p
Bacterial contamination	49	0,75	0,434	25	0,38	0,490	0,0005
Streptococcus mutans	22	0,34	0,477	5	0,08	0,269	0,0002
Streptococcus sanguinis	11	0,17	0,378	0	0,00	0,000	0,0009
Streptococcus spp	0	0,00	0,000	3	0,05	0,211	0,0833
Streptococcus salivarius	2	0,03	0,174	1	0,02	0,124	0,5637
Streptococcus mitis	3	0,05	0,211	2	0,03	0,174	0,6547
Gemella morbillorum	**0**	0,00	0,000	**2**	0,03	0,174	0,1573
Porphyromonas gingivalis	4	0,06	0,242	0	0,00	0,000	0,0455
Escherichia coli	1	0,02	0,124	3	0,05	0,211	0,3173
Lactobacillus spp	1	0,02	0,124	0	0,00	0,000	0,3173
Prevotella intermedia	2	0,03	0,174	3	0,05	0,211	0,6547
Actinomyces israeli	3	0,05	0,211	0	0,00	0,000	0,0833
Actinobacillus actinomycetemcomitans	1	0,02	0,124	0	0,00	0,000	0,3173
Enterococcus faecalis	1	0,02	0,124	3	0,05	0,211	0,3173
Stenotrophomonas maltophilia	4	0,06	0,242	0	0,00	0,000	0,0455
Candida albicans	9	0,14	0,348	7	0,11	0,312	0,6171
Klebsiella pneumoniae	3	0,05	0,211	0	0,00	0,000	0,0833

The frequency of those who had bacterial contamination, was reliably decreased after veneering. It should be noted that frequency of Streptococcus mutans, Streptococcus sanguinis, Stenotrophomonas maltophilia and Porphyromonas gingivalis was also reliably decreased.

At the next stage of the given research we studied bacterial contamination among those patients who had had old damaged veneers and compared them with the patients without old demaged veneers. Among the patients who had had a primary veneers, bacterial contamination frequency of Streptococcus mutans, Streptococcus mitis, Porphyrimonas gingivalis,

Stenotrophomonas maltophilia, Klebsiela pneumoniae was reliably high. Contamination with Candida albicans among the patients having primary veneers was not registered.

By using correlation analysis we defined dependence of microbe contamination on social – biological habits of organism, addictions, nutrition type and character, initial indicators of oral cavity, dental indexes, concomitant diseases and niduses of focal infection.(Table 3;4;5).

Table 3 Correlation between Bacterial Contamination of Oral Cavity and General State of an Organism after Veneering

	Bacterial contamination after veneering	
	R	p
age of 20 – 40	0,3513	0,0041
age of 41 - 60	-0,2546	0,0407
smoking	0,2544	0,0409
niduses of focal infection	0,3083	0,0125

Bacterial contamination after veneering reveals reliable positive correlation with the following factors: age of 20 - 40, smoking , niduses of focal infection, as for negative correlation with the age of 41 – 60.

Table 4 KCorrelation between Bacterial Contamination of Oral Cavity and The features of Oral Cavity before Veneering

	Bacterial contamination before veneering	
	r	p
excessive sweet eating	0,2596	0,0368
decompensated caries	0,2436	0,0505
relapsing caries	0,4087	0,0007
change of filling color	0,2596	0,0368
revealing of pathological micro flora	0,3049	0,0135
existence of veneer	0,3528	0,0039

Bacterial contamination before veneering reveals reliable positive correlation with the following factors: excessive sweet eating, decompensated caries, relapsing caries, change of filling color, revealing of pathological micro flora , existence of veneer.

Table 5 Correlation between Oral Cavity Microbial Contamination and Existence of old Damaged Veneers

	Existence of old veneer	
	r	p
Streptococcus mitis	0,2529	0,0421
Porphyromonas gingivalis	0,2944	0,0173
Stenotrophomonas maltophilia	0,2944	0,0173
Klebsiella pneumoniae	0,2529	0,0421

Existence of old veneer reveals reliable positive correlation with the following factors: - Streptococcus mitis, Porphyromonas gingivalis, Stenotrophomonas maltophilia, Klebsiella pneumonia; Streptococcus mitis reveals reliable positive correlation with hygienic $r=0,2956$, $p<0,0177$ and periodontal indexes $r=0,2449$, $p<0,0531$.

Discussion

Oral cavity diseases develop as a result of local micro flora imbalance that causes dissemination of potentially pathogenic bacteria Disorder of oral cavity ecosystem can be caused by local as well as environmental factors [12].

Oral cavity bacterial contamination depends on the patient's lifestyle, in the group of patients among which the microbe was sown out, mainly carbohydrate nutrition type, excessive sweet eating and direct occlusion is reliably high[13]

In the mentioned above group decompensated caries, change of filling colour is reliably high, relapsing caries develops authentically more frequently.

According to the literature, Microbial flora of dental deposit is not permanent - neither quantitatively, nor qualitatively [14]. In the microbial colonization there are over 70% of Streptococci [15], in our case microbes of Streptococci group prevailed among microbes 38/49 (77%), as for Fungi, the most frequent was Candida albicans (16), based on our material, Candida albicans were registered 9/49(18,4%). After veneering frequency of bacterial

contamination, particularly, frequency of Streptococcus mutans, Streptococcus sanguinis, Stenotrophomonas maltophilia and Porphyromonas gingivalis was reliably reduced.

According to the literature, oral cavity status study 14.6 months after veneer application showed 91, 2% of positive result, reliable difference between gingivitis and bleeding indexes before and after veneering was not registered [17]. In the composite resin group, there was a significant increase in the total bacterial counts, and a significant ($p<0.05$) decrease in Gram-positive, aerobic bacteria, which was associated with a significant ($p<0.05$) increase in the Gram-negative, anaerobic microbiota [18]. In accordance with our data, existence of old damaged veneer influences oral cavity microbial contamination, among the patients having old veneer, bacterial contamination frequency of Streptococcus mutans, Streptococcus mitis, Porphyrimonas gingivalis, Stenotrophomonas maltophilia, Klebsiela pneumoniae was reliably high. Streptococcus mitis, Porphyromonas gingivalis and Klebsiella pneumoniae reveal reliable positive correlation with existence of old veneer.

Before veneering Streptococcus mitis reveals reliable positive correlation with hygienic and periodontal indexis.

Conclusion

- Oral cavity bacterial status showing significant association with general state of oral cavity and organism.
- Existence of old damaged veneer influences oral cavity microbial contamination. After veneering bacterial status of oral cavity improves

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