

REPUBLIC OF AZERBAIJAN

On the right of the manuscript

ABSTRACT

Of the dissertation for the degree of Doctor of Philosophy

**PREVENTION OF COMPLICATIONS
IN THE DENTAL AND SURROUNDING TISSUES
DURING USING VENEERS**

Specialty: 3226.01 – Dentistry

Profession: Medicine

Plaintiff: **Pusanbar Shahin Abdullayeva**

Bakı – 2021

The dissertation work was performed at the Prosthodontics Department of Azerbaijan Medical University.

Scientific supervisor: doctor of medical sciences, professor
Nazim Adil Panahov

Official opponents: doctor of medical sciences,
professor **Rizvan Mohsun Mammadov**

doctor of medical sciences, professor
Afet Rashid Agazade

doctor of philosophy in medicine
Rauf Mehrah Jafarov

Dissertation Council ED 2.05 Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at Azerbaijan Medical University

Chairman of the Dissertation council:

doctor of medical sciences, professor
Garay Chingiz Garaybeyli

Scientific Secretary of the Dissertation Council:

doctor of medical sciences, professor
Aga Chingiz Pashayev

Chairman of the Scientific Seminar:

doctor of medical sciences, professor
Rana Gurban Aliyeva



GENERAL REVIEW OF THE WORK

Revelance of the topic. In recent years, the growing demand for the aesthetic appearance of the teeth in the vast majority of the population, as well as the introduction and successful application of new technologies and materials have created the need for modern materials and methods in orthopedic dentistry, as in other areas of dentistry.^{1,2,3,4}

Recently, many protective methods have been proposed for the aesthetic correction of front teeth.⁵ Adhesive systems and composite materials allow to eliminate aesthetic defects without the use of traditional orthopedic treatments. The technology of aesthetic restoration of the vestibular surface of the teeth with composite veneers is widespread.⁶

For this purpose, various ceramic materials are widely used. In order to analyze the problem, special literature was studied and it was determined that there are completely contradictory opinions about the quality of the effect of abrasive and temperature treatment on tetragonal dioxide zirconium.

As in the case of any orthopedic dental construction, errors in the preparation of veneers, including unreasonable, without instructions, and sometimes against the background of contraindications, sharpening of teeth, sizing or adjustment of the finished veneer, as well as fixation

¹ Səfərov A.M. Azərbaycan Respublikasında stomatoloji aparatlar və protezlərin hazırlanması təcrübəsində tibbi təmiz termoplastların tətbiqinin eksperimental və kliniki əsaslandırılması. 2011

² Казеко Л.А., Тарасенко О.А. Реставрация передних зубов. Минск: БГМУ, 2015, 44 с.

³ Дерик А.Ф. Эстетика в ортопедической стоматологии. Керамические виниры // Научное обозрение. Медицинские науки, - 2017. 3, - с. 22-25.

⁴ Guth J.-F., Magne P. Optical integration of CAD/CAM materials // International Journal of Esthetic Dentistry, 2016, vol. 11, No. 3, p. 394–409.

⁵ De FA da Costa G., Borges B.C.D., de Assuncao I.V. Clinical Performance of Porcelain Laminate Veneers with minimal Preparation: A Systematic Review // Int. J. Experiment. Dent. Sci, - 2016. 5(1), - p. 56-59.

⁶ Güler A.U., Duran I., Yücel A.Ç., Ozkan P. Effects of air-polishing powders on color stability of composite resins // J Appl Oral Sci, - 2011. 19, - p. 505-510.

minor errors can result in certain complications in the teeth and surrounding tissues in the future.

These complications include incorrect shaving of the hard tissues of the teeth, incorrect placement of the retraction floss used in the measurement, problems caused by the adhesive-fixative, changes in the periodontium, increased postoperative sensitivity, acid problems, improper polymerization, complications during improper polymerization. As a result of unplanned and neglected occlusion, complications such as tearing, tearing and cracking of the structure also occur.^{7,8}

Despite the use of veneers for more than 30 years, the creation of new technologies and materials, disagreements among doctors about the advantages and disadvantages of the use of ceramic and composite veneers continue to this day. While researching possible literature sources, we came across a limited number of materials on such complications.⁹ It is these aspects that gave us the basis for the current study.

Object of research: patients treated with composite and ceramic veneers.

The purpose of the research was to develop a set of preventive measures to prevent complications that may occur in the teeth and surrounding tissues during the use of veneers.

Research objectives:

To achieve this goal, we have the following tasks:

1. Determining the share of veneer treatment among non-removable orthopedic dental structures.
2. Investigation of the hygienic condition of the oral cavity in the near and distant period after the fixation of veneers.

⁷ Chaves E., Cunningham G., Peres M. S., Rodriguez J. Improving smile and dental esthetics: a comprehensive periodontal and restorative approach after orthodontics // *European Journal of General Dentistry*, - 2014. 3(2), - p. 170–173.

⁸ Ge C., Green C.C., Sederstrom D., McLaren E.A., White S.N. Effect of porcelain and enamel thickness on porcelain veneer failure loads in vitro // *J Prosthet Dent.*, 2014, vol.111, p. 380–387.

⁹ Петрикас А.Ж., Петрикас О.А. Красота, улыбка, искусство, стоматология // *Межрегиональный научно-практический рецензируемый журнал*, - 2013. 2, - с. 35–41.

3. Assessment of the effect on the tissues of the supporting teeth in the near and long periods after the fixation of composite and ceramic veneers.

4. Evaluation of the dynamics of changes in the microcirculatory bed of the pulp and periodontium, the study of the reaction of the pulp in patients with ceramic and composite veneers.

5. Determination of physical and biochemical parameters of saliva in different periods in patients with veneers.

6. Development of a set of measures for the prevention of complications that may occur after the application of different types of veneers, depending on the method of preparation and the material from which they are made (composite or ceramic).

Research methods: clinical, special dental examination methods, physical-biochemical research methods.

Main thesis of the dissertation for defense

1. According to the results of retrospective analysis, the share of veneers in dental clinics of Baku is 3.28%;

2. Monitoring of the hygienic condition of the oral cavity and the degree of bleeding gums showed that the fixation of ceramic and composite veneers is less invasive and the shape of the veneer does not significantly affect the condition of the oral cavity. With proper and neat hygienic care, the condition of the oral cavity is satisfactory;

3. Hemodynamic parameters (linear and volume velocities) in the dental pulp are important diagnostic criteria for assessing blood flow, allowing to assess the degree of hemodynamic disturbances in the dental pulp and periodontal tissues;

4. Electroodontodiagnostics allows to determine the degree of pulp damage without pain for the patient;

5. No statistically significant changes in the biochemical parameters of saliva were detected after fixation of veneers. During various examinations conducted over 6 months, only statistically significant changes in viscosity were detected. In this case, the increase in viscosity was accompanied by a decrease in pH.

6. The use of algorithms creates conditions for the quality of work performed, as well as to achieve maximum aesthetic and functional effect.

Scientific novelty:

- For the first time, the characteristics of changes in the physical and biochemical parameters of saliva during the application of veneers were dynamically analyzed.

- In patients with veneers, immediately before and after 1 month of fixation, the microcirculatory bed of pulp and periodontal tissues was assessed by high-frequency dopplerometry, taking into account hemodynamic features, new information on the condition of the pulp and its activity in the background of veneers was obtained.

- The nature of the changes that can occur in the teeth and surrounding tissues when using different methods and materials has been investigated. The frequency and structure of complications in the process of using veneers, depending on the material and method of production, have been studied. The differences between ceramic and composite veneers have been studied comparatively.

Practical significance of the research.

A comprehensive action plan designed to prevent undesirable situations that may occur when using different materials in the manufacture of veneers will serve to reduce the complications that may arise in this case.

The practical application of the results obtained during the research will provide a basis for the rational use of this construction.

The proposed approaches for aesthetic restorations allow to achieve favorable results in the medium term. A comprehensive action plan has been developed to prevent complications that may occur after the preparation of veneers, and an algorithm for aesthetic restorations has been developed. A diagnostic complex has been proposed and substantiated for an integrated assessment of the condition of the oral cavity in the near and distant periods of veneer fixation.

Approbation.

The main provisions of the dissertation were presented at scientific-practical conferences: at the scientific-practical conference "Actual problems of medicine" dedicated to the 25th anniversary of the restoration of state independence of Azerbaijan (Baku, 2017); At the scientific-practical conference "Actual problems of medicine" dedicated to the 100th anniversary of the Azerbaijan Democratic

Republic (Baku, 2018); Scientific dialogue: Problems of medicine, collection of scientific articles based on the materials of the XIX international scientific conference, (St. Petersburg, 2019). The results of the dissertation are included in the teaching process of the Department of Orthopedic Dentistry of AMU and are used in the process of training students at the department. 11 scientific articles on the topic of the dissertation were published.

Introduction of outcomes of the research. The results of the dissertation are included in the teaching process of the Department of Orthopedic Dentistry of AMU and are used in the process of training students at the department.

The results of the research are also used in the treatment and prevention of patients at the “Premium Clinic” and the “Mirvari dish” Clinic.

The name of the organization where the dissertation has been accomplished. Prosthodontics Department of Azerbaijan Medical University.

Publications. 11 scientific articles and theses on the main provisions of the work were published. 8 articles and 3 theses were published, of which 3 articles and 1 thesis were published in abroad.

Volume and structure of the dissertation. The dissertation is presented in the form of a computer-generated text on 162 pages (239050 characters) and includes an introduction (6 p., 11450 characters), Chapter I Literature review (23 p., 43550 characters), Chapter II Research materials and methods (15 p., 20700 characters), Chapter III personal results (42 p., 59910 characters), Chapter IV discussion (38 p., 76230 characters), conclusion (13 p., 24070 characters), results (2 p., 2130 characters), practical recommendations (1 p., 990 characters). The bibliography list includes 190 sources (19 p.). The dissertation also includes 12 graphs, 8 tables and 10 photos.

MATERIALS AND METHODS OF RESEARCH

The basis of the study was the results of a prospective analysis of the medical histories of 732 people who applied to the dental clinic of AMU in 2016-2017, retrospective and 109 patients who applied

veneers. The average age of 109 patients involved in the study was between 18-45 years. Of the veneered patients, 42 were male (38.5%) and 67 (61.5%) were female.

Studies were conducted in dynamics before veneering, 1, 3, 6 months and 1 year after veneer fixation.

The results of the obtained physico-biochemical indicators were compared with the comparison group. The comparison group consisted of 20 individuals who had a normal oral cavity, no complications such as inflammation, a slightly altered shape, size, and condition of their teeth, and who did not use veneers. The mean age in this group was 29.3 ± 2.05 ; 9 of them were men (45.0%) and 11 (55.0%) were women.

Examination of patients was carried out according to the generally accepted methodology using clinical and special research methods.

The initial examination of patients was based on traditional anamnestic and instrumental clinical examinations. A specialized card consisting of 14 items was filled out for each patient.

Patients were diagnosed with: broad aesthetic index (GEI); toothpaste, D.A. The rate of loosening according to Entin (1954); Green-Vermillion (Green, Vermillion, 1964) or OHI-S (Oral Hygiene Index) hygiene index; Mülleman-Cowell Index (Sulcus Bleeding Index, Mühlemann Cowell, 1975). Two- and three-dimensional radiological examination during the study; Electroodontodiagnostics with the device "IVN-01 Pulptest-Pro"; High-frequency ultrasound Doppler fluorometry was performed. In addition, the level of physicochemical (pH, viscosity) and biochemical (albumin, calcium and phosphorus ions, alpha-amylase, alkaline phosphatase) indicators of drinking water was studied in the Central Scientific Research Laboratory of the Azerbaijan Medical University.

Statistical processing of the results was carried out in the program "Statistica for Windows". In this case, the Student's criterion (t), which determines the accuracy of the difference between the mean values for the calculation of the average mathematical quantity (M), the standard deviation (σ), the average mathematical error (m), the different volume samples (n) and the probability of error (p.) was used.

RESEARCH RESULTS AND THEIR DISCUSSION

Results of determination of specific weight of veneers and frequency of their use (retrospective analysis)

In the dental clinics of our choice, 480 (65.57%) out of 732 patients had metal-ceramic caps, 48 (6.56%) had zircon caps, 36 (4.91%) had emax ceramic caps, 84- (11.47%) were fully plate prostheses, 60 (8.20%) were braces, and 24 (3.28%) were veneers. Comparing the results of our study, it was found that patients treated with veneers had a lower incidence ($p < 0.01$) than patients treated with other orthopedic structures. Thus, the frequency of use of veneers with metal-ceramic lid is 20.0 ($p < 0.001$), with zircon lid is 2.0 ($p < 0.05$), with enameled ceramic lid is 1.5 ($p < 0.05$), with full plate prosthesis is 3.5. ($p < 0.01$) was 2.5 times less ($p < 0.01$) with the bugel prosthesis.

Of the patients treated with veneers, 15 (62.5%) were women and 9 (37.5%) were men.

According to the material from which the veneers were made, ceramic veneer was used in 18 patients and composite veneer in 6. That is, ceramic veneer was used 3.0 times ($p < 0.01$) more than composite veneer.

It is possible to increase the intensity of treatment with the use of veneers by raising awareness among the population and explaining the advantages of this design. In this regard, the media can play a major role.

Veneers were prepared for 109 people aged 18-45 (average age 31.4 ± 3.51) who applied to the Department of Orthopedic Dentistry of the Azerbaijan Medical University. Of these, 42 were men (38.5%) and 67 (61.5%) were women. The majority of patients were 30 people (27.5%) aged 23-29 years. The minimum number of patients was between 18 and 22 years. In this case, we do not exclude the role of the material factor. The following shapes of the face are distinguished: oval, oval-triangular, trapezoidal, square, rectangular and triangular. Among those surveyed, 44.9% (49 patients) were more oval. In 16 patients (14.7%) oval-triangular, in 15 (13.8%) trapezoidal, in 12 (11.0%) square, in 10 (9.2%) rectangular and in 7 (6.4%) triangular and conical face shape were distinguished. Visual transparency was determined at the four intersections of the slope. It was found that the

transparency is mainly in the part of the cutting edge with mammoths. Out of 109 patients, 9 (8.3%) had complete transparency of the teeth, 23 (21.1%) had an equally transparent cutting edge without mammals, 35 (32.1%) had a transparent cutting edge with mammals, and 42 (38, 5%) opaque teeth were identified. Thus, the number of opaque teeth was 4.6 times higher than that of fully transparent teeth ($p < 0.001$).

In the transparency study, 47 patients aged 18-30 years had a complete transparency of 12.8% (6 patients), opaque teeth 23.4% (11 patients), and teeth with an equally transparent cutting edge without mammals 27.7% (13 patients). and teeth with a transparent cut edge with mammals were identified in 36.2% of cases (17 patients). Thus, in 17 men and 30 women of this age group, the complete transparency of the teeth was 11.8% and 10.0%, respectively, non-transparent teeth 29.4 and 23.3%, equally transparent cutting edge without mammals 23.5% and 30.0%, transparent cutting edge with mammoth was 35.3% and 36.7%. Among people aged 31-45 years, fully transparent teeth were found in 4 patients, ie 6.5% of them, while opaque teeth were found in almost half of those observed in 30 (48.4%). In 10 (16.1%) and 18 (29.0%) patients, teeth without mammals and teeth with a transparent cutting edge with mammals were distinguished, respectively. Complete tooth transparency was observed in 8.0% of men and 5.4% of women in patients aged 31-45 years. In this age group, opaque teeth were found in 48% of men and 48.6% of women. Teeth with a smooth cutting edge without mamelons were observed in 16.0% of men and 16.2% of women. Teeth with a transparent cut edge with a mammoth were found in 41.2% and 29.7% of men and women, respectively.

Comparing the obtained results on the basis of tooth transparency, it was found that in the relatively young age group (18-30) the number of transparent teeth was 2.0 times higher ($p < 0.05$) than in the 31-45 age group, and the number of opaque teeth was 2, Was 1 time less ($p < 0.05$). In patients aged 18-30 years, 1.7 times more teeth ($p < 0.05$) with a transparent cutting edge without mammals were found. The relative frequency of teeth with a transparent cut edge with a mammoth was statistically negligible.

Thus, patients had a more oval face shape (44.9%) and opaque teeth (38.5%).

Restoration of teeth with veneers

The main complaints of the patients were unsatisfactory aesthetics, and therefore they applied to improve the aesthetic appearance of the teeth. patients) changes in shape and size, mine erosion, in 22.0% of cases (24 patients) anomalies of the position in the dentition and density of teeth, in 12.8% of cases (14 patients) the listed symptoms were combined.

The method recommended by Galip Gurel (2007) was used in the preparation of veneers. A temporary Mock Up structure was created in the patient's mouth. Patients have the opportunity to continue an active lifestyle with temporary structures as close as possible to permanent teeth. Patients can assess the condition of the teeth and, if necessary, have the opportunity to make corrections in the temporary caps.

Thus, during direct modeling, a composite sample was created directly in the oral cavity based on the wax model. In this variant, both the aesthetics and functionality of the tooth are created at once.

Monophasic silicone measuring material was used in 56.9% of cases with the preparation of individual spoons in advance to obtain measurements when making ceramic veneers. In another 43.1% of cases, measurements were made using double silicone measuring material.

Special attention was paid to the formation of a smooth and thoroughly polished surface of the temporary structure, as well as the edges of the structure were cut in such a way as to completely eliminate the impact on the surrounding soft tissues.

A total of 288 veneers were prepared for patients, of which 276 were made for the maxillary and 12 for the maxillary teeth. Of the teeth, 121 were central and lateral incisors, 38 were first premolar, 34 were canine teeth, 250 were vital and 38 were non-vital, in other words, depulped teeth.

The color of the depulped teeth, that is, the nerve was removed and filled with filling material, was changed. After examination, it was determined that 38 patients had depulpation and their adjacent teeth were in satisfactory condition. Taking into account this and the patient's wish, it was decided to install veneers.

Monitoring the condition of the oral cavity after fixation of veneers

Patients were divided into 2 groups: the first group included 71 patients with ceramic veneers, the second group included 38 patients with composite veneers.

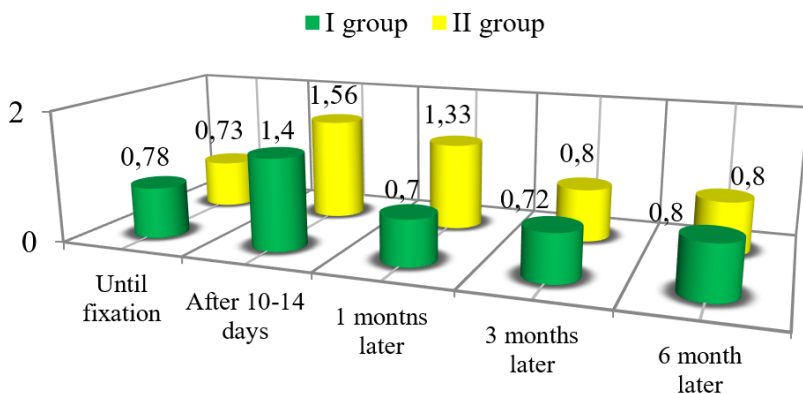
Although the amount of OHI-S index did not differ between patients in both groups prior to veneer fixation, a number of differences were later found, although they were not statistically significant.

After 10-14 days, the oral hygiene status in both groups improved by 23.7% and 19.0% in groups 1 and 2, respectively, compared to baseline. The study of the hygienic condition of the oral cavity after 1 month showed an improvement, and compared to the initial indicators, this difference was 32.2% ($p < 0.05$) in group 1 and 29.5% ($p < 0.05$) in group 2. organized. After 3 months, oral hygiene in both groups of patients was virtually indistinguishable from that before veneer fixation. A study of the OHI-S index after 6 months showed that oral hygiene in patients with ceramic veneers did not differ from the previous one. At the same time, oral hygiene worsened in patients with composite veneer; this was indicated by a difference in the OHI-S index from baseline: in patients with composite veneer, oral hygiene generally deteriorated by 13.8% after 6 months.

A study of the GI index 10-14 days after fixation showed the presence of mild gingivitis, but this index improved in patients from both groups after 1 month compared to baseline. The results of the study showed that after 1 month in patients of groups 1 and 2, inflammation was practically the same as in the initial period of fixation - 28.0% ($p < 0.05$) and 28.4% ($p < 0, 05$). Subsequently, the decrease in gingivitis continued in group 1 after 3 and 6 months, and the GI index was 56% lower than in the first 10-14 days, respectively ($p < 0.01$). In this case, the GI inflammation index in patients with ceramic veneers generally remained stable after 3 and 6 months. At the same time, in group 2 patients, after 6 months of fixation, the GI index increased slightly compared to the previous quantity. Thus, in this group after 3 months the difference compared to the first 10-14 days was 53.4% ($p < 0.01$), after 6 months it was 43.2% ($p < 0.01$), ie after 6 months the inflammation The tendency to progress can be noted.

Analysis of the results of the gum bleeding index in the examination groups showed the presence of bleeding in the first days after fixation, and its complete disappearance or reduction in the following days. In the first group of patients, the maximum level of SBI index was recorded only after 10-14 days, the changes were observed only in the gums of shaved teeth. 10-14 days after fixation, the mean bleeding index increased 1.8 times ($p < 0.01$) compared to the baseline level. Then the bleeding index returned to the previous level and for 6 months it did not differ from the previous level. Slightly different dynamics were observed in group 2 patients. 10-14 days after the installation of composite veneers, the gingival bleeding index of the abutment teeth (1.56 points) increased by an average of 2.2 times ($p < 0.01$) compared to the initial values (0.73 points). After 1 month, this index decreased (1.33 points), but nevertheless was 1.8 times higher than the previous indicator ($p < 0.01$). Only after 3 months, the bleeding of the gums of the abutment teeth (0.8 points) differed from the initial indicator and remained at this level until the 6th month ($p < 0.01$).

A comparative analysis showed that the largest changes between groups occurred in the SBI index (graph 1).



Graphic 1. Dynamics of SBI index of patients in the examined groups (in points)

Bleeding increased 10-14 days after fixation in both groups of patients, but in patients with composite veneers (1.56 points) this figure was 11.4% higher than in patients with ceramic veneers (1.40

points). After 1 month, the difference was 90.0% ($p < 0.01$). The SBI index was 0.7 points in the 1st group and 1.33 points in the 2nd. No significant differences were noted in the 3rd and 6th months of the examinations. During this period, the SBI index was 0.72 points in group 1 and 0.80 points in group 2 ($p < 0.01$).

Thus, composite veneer had a more irritating effect on gum bleeding in the early stages than ceramic veneer. Proper and accurate hygienic care can prevent gum bleeding.

It should be noted that the dynamics of the hygienic condition, inflammation, bleeding were similar. The level of OHI-S, GI and SBI indices in patients with ceramic veneers did not change steadily for 3-6 months, and in patients with composite veneers all three indices tended to deteriorate, although the difference was not much compared to the initial indicators. At the same time, there were no significant changes between the indicators in both groups. We attribute the slight deterioration of hygiene and the condition of the oral cavity in general to the lack of proper and thorough cleaning of the teeth. It is possible that in the first days and months, the care of patients for fixed veneers subsequently weakened and resulted in a change in the condition of the oral cavity within 6 months. Communication with patients revealed that the majority of them 87.2% (95) brush their teeth once a day, and 96.3% (105) did not rinse their mouths after eating or do it irregularly.

Results of radiological analysis

In 18 (16.5%) patients with pathologically abraded teeth, the height of the crown of the tooth was 1-2 mm. Radiologically, they had normal tooth root formation, but in contrast to the norm, their cavity was narrowed, the roots were slightly thinner and shorter. Hereditary disorders of dentinal development were found in 9 (8.3%) patients. X-ray examination revealed underdevelopment of the roots of these teeth, short cone-shaped sharpened roots. However, the crowns of the teeth had a normal structure. X-ray and orthopantograms of 10 (9.2%) patients revealed a first premolar and canine-like defect in canine teeth.

X-ray examination of patients with enamel fissures revealed no changes in bone tissue and tooth decay. The resorption coefficient was zero in all patients.

The state of hemodynamics in the pulp and periodontium of teeth shaved for the preparation of veneer

Maximum systolic velocity (V_{as}) after immediate application of veneers in the gums (periodontium) and pulp of patients treated with ceramic veneer was, on average, 51.6% ($p < 0.05$) and 47.9% ($p < 0.05$), respectively, compared with baseline values. After 10-14 days, the V_{as} index decreased, but was still 30.5% ($p < 0.05$) and 30.1% ($p < 0.05$) higher than the initial value; After 1 month, the maximum systolic velocity was virtually equal to the initial value in both the periodontium and the pulp. Prior to the application of ceramic veneers, the mean linear velocity (V_{am} , cm / sec) of blood flow in the gum tissue and tooth pulp did not differ significantly. Immediately after fixation, an average increase of 13.3% and 14.3%, respectively, was observed in the gum tissue and pulp compared to the initial value. After 10-14 days, a slight decrease was noted, and after 1 month, the V_{am} index was almost indistinguishable from the initial value in both periodontal and dental pulp. The final diastolic velocity (V_{akd}) of blood flow decreased by 17.4% in the periodontium and 25.3% in the pulp immediately after fixation. After 10-14 days, this indicator was 9.7% lower than the initial periodontal period, and after 30 days it was 7.7%. Similar dynamics were observed in the pulp; The time indicator was 12.1% and 9.0% lower than the initial indicator after 10-14 days and 30 days, respectively.(table 1).

The dynamics of blood flow volume readings (maximum systolic (G_{as}) and mean (G_{am})) as well as linear velocity readings showed an increase immediately after fixation, but did not differ from the initial reading after 30 days. Thus, immediately after fixation, the level of gas was 25.0% higher than the initial values in the gum tissue, in the pulp - 16.7%; After 10-14 days, it increased by 10.2% and 7.6%, respectively, and after 30 days, the G_{as} index did not differ from the initial value in the gum tissue, but was 4.2% in the pulp. Immediately after fixation, the mean gamma rate increased by 53.3% ($p < 0.05$) and 56.8% ($p < 0.05$) in both the periodontium and pulp, respectively. Then the G_{am} indicator decreased, after 1 month the difference in the pulp was 18.9% compared to the initial indicator, and there was no difference in the periodontium.

Table 1.**Blood flow in the periodontium and pulp before and after fixation in patients with ceramic veneer (n = 71)**

Indications		Prior to fixation	immediately after fixation	After 10-14 days	After 30 days
Vas, cm / sec	periodont	1,25±0,02	1,94±0,08*	1,67±0,07*	1,33±0,05
	Pulp	1,46±0,03	2,16±0,05*	1,90±0,04*	1,48±0,03
Vam, cm / sec	periodont	1,25±0,02	0,68±0,06	0,65±0,03	0,61±0,04
	Pulp	0,63±0,05	0,72±0,05	0,71±0,06	0,65±0,05
Vakd, cm / sec	periodont	1,25±0,02	0,588±0,08	0,643±0,08	0,657±0,03
	Pulp	0,725±0,02	0,542±0,05	0,637±0,05	0,660±0,05
Qas, ml / min	periodont	1,25±0,02	1,10±0,03	0,97±0,05	0,89±0,03
	Pulp	1,44±0,03	1,68±0,04	1,55±0,07	1,50±0,08
Qam, ml / min	periodont	1,25±0,02	0,046±0,002*	0,037±0,003	0,030±0,003
	Pulp	0,037±0,008	0,058±0,006*	0,050±0,005	0,044±0,007
PI	periodont	1,25±0,02	2,64±0,08	2,50±0,07	2,40±0,06
	Pulp	1,13±0,005	1,61±0,07*	1,44±0,08	1,21±0,04
RI	periodont	0,660±0,004	0,730±0,006	0,697±0,008	0,671±0,005
	pulp	0,665±0,003	0,778±0,004	0,771±0,005	0,686±0,004

Note * - statistical accuracy of the difference between the compared values of veneers before and after fixation ($p < 0.05$)

In patients treated with ceramic veneer, the pulsation index increased by 13.8% in the periodontium and 42.5% ($p < 0.05$) in the pulp immediately after fixation. A decrease in this index was observed in the dynamics, and after 30 days the average PI was 3.4% in the periodontium and 7.1% in the pulp compared to the initial indicator. Purselo peripheral resistance index (RI) increased 10.6% immediately after fixation in the periodontium, 17.0% in the pulp, 5.6% and 15.9% after 10-14 days, and 1.7% and 3.2% after 30 days. % was high.

In patients treated with composite veneer, the maximum systolic velocity (Vas) of blood flow in the gums and pulp immediately after fixation was 40.8% ($p < 0.05$) and 39.5% ($p < 0.05$), respectively, compared with the initial value.), After 10-14 days was 31.2% and 31.6%, 30 24.8% and 23.7% higher. The mean systolic velocity (VM) of blood flow increased by 29.5% immediately after fixation and by

33.3% in the pulp. As a result, a decrease in the mean velocity was noted, and after 10-14 days in the periodontium and pulp it was 18.0% and 28.6%, respectively, and after 20 days it was 11.5% and 19.0% higher.

The final diastolic velocity (Vakd) in the periodontium and pulp immediately after fixation decreased by 16.9% and 23.8%, respectively, increased after 10-14 days, and the difference between the initial values was 10.3% and 15.4%. The time level continued to increase and after 30 days the difference with the initial indicator was insignificant.

In patients with composite veneer, as in patients with ceramic veneer, there was an increase in gas in the periodontium and pulp. Immediately after fixation of composite veneers, the maximum systolic volume velocity in the periodontium and pulp increased by 30.7% and 21.1%, respectively, compared with the initial value, and after 10-14 days the difference compared to the initial value was 17.0% and 15.5%, 30 after the day it was 9.1% and 11.3%. (table 2).

Other blood flow velocity indicators Gam increased by 80.0% ($p < 0.05$) in the periodontium and 72.2% ($p < 0.05$) in the pulp immediately after veneer fixation in this group of patients. Dynamic analysis showed a decrease in this indicator over time. After 10-14 days, the level of this indicator in the gum tissue was 43.3% ($p < 0.05$) higher than the initial indicator, 66.7% higher in the pulp, and after 30 days it was 23.3% and 33.3%, respectively. Immediately after fixation in the gum tissue, the pulsation index increased by 18.7%, and after 10-14 and 30 days was higher by 13.9% and 6.9%, respectively. In the pulp, this indicator was 50.4% ($p < 0.05$) higher than the initial value immediately after fixation, the difference decreased after 10-14 and 30 days, and the values were 44.2% ($p < 0.05$) and 31.0, respectively. % organized. The index of peripheral resistance immediately after the application of composite veneers increased by 18.7% in gum tissue and 14.8% in pulp compared to the initial value, after 10-14 days it was 13.3% and 11.0% higher than the initial value and 30 after the day was 7.0% and 6.1% higher, respectively. With the use of composite veneers, the return to normal occurred later than in patients with For example, 30 days after application of ceramic veneers, the linear

Table 2.**Blood flow in the periodontium and pulp before and after fixation in patients with composite veneer (n = 38)**

Indications		Prior to fixation	immediately after fixation	After 10-14 days	After 30 days
Vas, cm / sec	periodont	1,25±0,02	1,76±0,06*	1,64±0,06	1,56±0,03
	Pulp	1,52±0,04	2,12±0,03*	2,0±0,05	1,88±0,05
Vam, cm / sec	periodont	0,61±0,02	0,79±0,03	0,72±0,04	0,68±0,02
	Pulp	0,63±0,02	0,84±0,04	0,81±0,02	0,75±0,04
Vakd, cm / sec	periodont	0,710±0,05	0,590±0,07	0,637±0,03	0,680±0,04
	Pulp	0,727±0,02	0,554±0,02	0,615±0,04	0,678±0,03
Qas, cm / sec	periodont	0,88±0,02	1,15±0,04	1,03±0,02	0,96±0,02
	Pulp	1,42±0,02	1,72±0,03	1,64±0,04	1,58±0,03
Qam, ml / min	periodont	0,030±0,002	0,054±0,002*	0,043±0,003*	0,037±0,002
	Pulp	0,036±0,005	0,062±0,003*	0,060±0,002*	0,048±0,003
PI	periodont	2,30±0,05	2,73±0,03	2,62±0,04	2,46±0,03
	Pulp	1,13±0,003	1,70±0,02*	1,63±0,04*	1,48±0,03
RI	periodont	0,668±0,003	0,793±0,002	0,757±0,005	0,715±0,002
	pulp	0,670±0,002	0,769±0,003	0,744±0,004	0,711±0,003

Note * - statistical accuracy of the difference between the compared values of veneers before and after fixation ($p < 0.05$)

velocities of blood flow Vas, Vam and volume velocities Gas and Gam did not differ from the initial values, but there was an insignificant difference between the final diastolic velocity (Vakd) and index (PI, RI). At the same time, in patients treated with composite veneer, there was a difference between the indicators 1 month after fixation and the initial indicators. In particular, Vas and Gam values were 20.0% of the initial value in the gum tissue and periodontium after one month, Vam was more than 10%, and the pulsation index was more than 30%.

Electroodontodiagnostic assessment of the condition of the pulp in the teeth prepared for the application of veneer

Immediately after dental prosthetics, the electrical excitability of the pulp increased in all groups of teeth, but control measurements

after 12 months showed a decrease in electrical excitability and even a return to baseline values. Prior to dentures, the electrical excitability of incisors increased by about $3.6 \pm 1.30 \mu\text{A}$, then by $5.0 \pm 1.02 \mu\text{A}$, ie by an average of 38.9% ($p < 0.05$), and after 12 months the average. The index was $4.0 \pm 1.20 \mu\text{A}$. This is almost no different from the initial figure.

Prior to the prosthesis of canines, the electrical excitability was $4.2 \pm 0.78 \mu\text{A}$, then an average of $5.4 \pm 1.0 \mu\text{A}$, and the control examination was $4.3 \pm 1.1 \mu\text{A}$. After prosthetic dentures, the electrical excitability index ($5.4 \pm 1.0 \mu\text{A}$) increased by 28.6% ($p < 0.05$) compared to the baseline ($4.2 \pm 0.78 \mu\text{A}$). $4.3 \pm 1.1 \mu\text{A}$ returned. Prior to the prosthesis of premolar teeth, the electrical excitation was $5.4 \pm 0.52 \mu\text{A}$. After prosthesis, a slight increase ($6.0 \pm 0.26 \mu\text{A}$) was observed in premolar teeth. During the control measurement, the electrical excitability in the premolar teeth was reduced to $5.1 \pm 0.92 \mu\text{A}$. The difference in electrical arousal before and 12 months after fixation was not statistically significant.

A comparative analysis of electrical arousal in the teeth showed that the highest premature arousal was in the second premolar and the lowest in the incisors. Prior to dentures, the electrical excitability of incisors was on average 34.0% ($p < 0.05$) lower than that of premolar teeth. After prosthesis, the difference between these groups of teeth was 19.4%, and in the control examination was 25.9% ($p < 0.05$). The electrical excitability of canine teeth was on average 19.2% lower than the electrical excitability of pemolar teeth before restoration, the difference was almost unchanged immediately after restoration and amounted to 19.4%; The difference increased after 12 months and amounted to 20.4%. No significant difference was observed when measuring the electrical excitability of the pulp in the teeth shaved for the application of ceramic and composite veneers.

Indicators of dynamic measurement of electrical arousal in teeth with the use of ceramic and composite veneers reflect compliance with accepted normative indicators. Thus, after restoration, the electrical excitability increased by 16.9% in teeth applied to ceramic veneer, and by 29.9% ($p < 0.05$) in composite veneer. After 12 months, electrical excitability during control measurements decreased in patients treated

with both ceramic and composite veneers, but was 11.8% and 19.8% higher than baseline, respectively.

Therefore, the sensitivity of veneered teeth for veneer application - regardless of the type of veneer used - was not statistically significantly different from healthy teeth. This showed that secondary inflammation-degenerative pulp in the pulp, as well as shaving did not cause pathological changes.

Thus, through electroodontodiagnostics it is possible to obtain information about the condition and functionality of the pulp in the teeth. The pulp acts as the trophic center of the tooth tissue, preventing microbes from entering between the periodontium, the root tissue of the tooth, and the alveolar bone. However, dystrophic processes in nerve receptors can occur with changes in electrical sensation in the dental pulp during various pathological processes. Leaving the dentin layer exposed in some areas of the tooth during shaving can irritate the pulp and mechanically or thermally damage it. Therefore, it is necessary to monitor his condition.

Physico-biochemical parameters of saliva in patients with veneers

10-14 days after fixing the veneers, the pH varied between 6.62-7.1 and the viscosity between 0.10-0.18. The concentration of hydrogen ions in saliva was virtually indistinguishable from the comparison group 10-14 after veneer fixation. Determination of viscosity in patients with veneers showed a tendency to increase this indicator in general. Comparison of viscosity 10-14 days and 6 months after fixation showed that in patients of group 1 this indicator was 26.7% ($p < 0.05$) and in group 2 31.2% ($p < 0.05$). increased.

In patients with veneers, the amount of albumin decreased by an average of 4.5 and 10.5%, respectively, in groups I and II compared with the comparison group. After 1 month, albumin levels decreased slightly in patients with ceramic veneers and remained at the same level in the group with composite veneers. In subsequent periods, after 3 and 6 months, albumin levels began to increase gradually in both groups, but the difference in baseline was not significant between either group or within the group.

The activity of calcium and phosphorus ions in saliva, as well as alpha-amylase and alkaline phosphatase, is shown in Table 3.7.

In patients with veneers, the difference in the amount of calcium ions with the comparison group was negligible after 10-15 days. After 1 and 3 months, the amount of calcium was almost unchanged in both groups, and at 6 months it was practically no different from the comparison group (table 3).

Table 3.

Biochemical parameters of saliva in the research group

Indications	Duration of the study	1 group (n=71)	2 group (n=38)	Comparison group (n=20)
Calcium, mmol/l	10-14 day	1,69±0,52	1,66±0,46	1,72±0,16
	1 month	1,67±0,40	1,65±0,50	
	3 month	1,68±0,44	1,68±0,26	
	6 month	1,71±0,50	1,70±0,45	
Phosphorus, mmol/l	10-14 day	5,91±1,02	5,88±0,78	6,03±0,08
	1 month	5,93±0,80	5,90±0,72	
	3 month	5,98±1,0	5,96±0,84	
	6 month	5,98±0,66	5,96±0,58	
α- Amylase, mkKat/l	10-14 day	4,37±1,03	4,26±0,88	4,57±1,24
	1 month	4,41±0,70	4,28±0,56	
	3 month	4,45±0,93	4,32±0,88	
	6 month	4,46±1,0	4,37±0,62	
Alkaline phosphatase, mkKat/l	10-14 day	1,62±0,77	1,58±0,36	1,63±0,60
	1 month	1,61±0,45	1,55±0,44	
	3 month	1,58±0,51	1,55±0,70	
	6 month	1,57±0,66	1,53±0,82	

According to the results obtained, the amount of phosphorus, as well as calcium, decreased slightly compared to the comparison group, but gradually increased, and in 3-6 months did not differ from the common values of the comparison group and the first days of fixation. The calcium / phosphorus ratio in the comparison group was 0.28, and

in groups 1 and 2 it was 0.28 in the same year after 10-15 days and 6 months. After 10-14 days, the activity of α -amylase decreased slightly by 4.6% in both groups compared to the comparison group, and by 6.8% in groups 1 and 2, respectively. Later, the activity of the enzyme increased. In contrast, the activity of the enzyme alkaline phosphatase did not differ from the comparison group in the first days of fixation, but later a decrease in activity was observed, although the difference between the comparison group quantity and the initial values was not statistically significant.

No statistically significant changes in biochemical parameters in saliva after fixation of veneers were found. During the 6 months of the examinations, significant changes were recorded only in the viscosity indicators. In this case, the increase in viscosity was accompanied by a decrease in pH. Thus, in patients with ceramic veneers, the viscosity after 10-15 days and 6 months is 0.15-0.19 PaS and pH 6.98-6.74, respectively, in those with composite veneers 0.16-0.21 PaS and pH 6.75-6.72.

Algorithm for aesthetic restoration

We offer the following as a direct restoration algorithm.

1. Examination of the oral cavity and hygienic cleaning of teeth.
2. Determination of OHI-S, GI, SBI indices.
3. Radiography (2, 3 sizes), orthopantomography.
4. Pulp / endodontic status assessment: assessment of hemodynamics by high-frequency ultrasound dopplerography; Electroodontodiagnostics with the device "IVN-01 Pulptest Pro".
5. Preparation for restoration: visual selection of color; anesthesia.
6. Shaving and surface treatment of teeth.
7. Isolation of the tooth from the patient's wet breathing and saliva.
8. Dental cap modeling.
9. Restoration of teeth.
10. Determination of physical and biochemical parameters of saliva (pH, viscosity, albumin, calcium, phosphorus, amylase, alkaline phosphatase).
11. Evaluation of restoration.
12. Control examination of the oral cavity, pulp / endodontic status, saliva after 10-14 days, 6/12 months.

We offer the following as an algorithm for indirect restoration.

1. Examination of the oral cavity and hygienic cleaning of teeth.
2. Determination of OHI-S, GI, SBI indices.
3. Radiography (2-, 3-dimensional), orthopantomography.
4. Pulp / endodontic status assessment: assessment of hemodynamics by high-frequency ultrasound dopplerography; Electroodontodiagnostics with the device "IVN-01 Pulptest Pro".
5. Preparation for restoration: visual selection of color; anesthesia.
6. Shaving and surface treatment of teeth.
7. Measurement with A-silicone mass.
8. After the measurement mass is hardened, it is sent to the laboratory and a "master model" is poured based on these measurements. The plaster model is an accurate copy of the patient's teeth. The technician prepares the veneer in 1-2 weeks, during which time the dentist personally repairs the temporary veneer he formed during the first meeting with the patient in the dental office.
9. Placement of veneer in the oral cavity, detection of defects. The veneer is then removed, the defects removed, and placed back into the tooth once the exact edge has been aligned.
10. Drying
11. Impregnation of PermaCem DMG, MaxCem Elite Kerr, Nexus Kerr adhesive system and double hardening cement on the surface of the veneer and its fixation in the oral cavity.
12. Final evaluation of veneer occlusion contacts in central and lateral occlusions.
13. Polishing.
14. Floss examination of medio-distal contacts.
15. Determination of physical and biochemical parameters of saliva (pH, viscosity, albumin, calcium, phosphorus, amylase, alkaline phosphatase).
16. Evaluation of restoration.
17. Control examination of the oral cavity, pulp / endodontic status, saliva after 10-14 days, 6/12 months.

CONCLUSION

1. According to the results of retrospective analysis, the share of use of veneers among the surveyed persons was 3.28%, of which the share of ceramic veneers was 75.0%, the share of composite veneers was 25.0% [1].
2. Although the dynamics of oral hygiene indicators are similar when using ceramic and composite veneers, the level of this indicator did not change steadily for 3-6 months in patients with ceramic veneers, and in patients with composite veneers the index initially deteriorated, but compared to initial indicators. the difference between them was not statistically accurate [8].
3. The maximum level of gingival bleeding index (SBI = 1.4 points) of the supporting teeth of patients with ceramic veneers was recorded only after 14 days and was 1.8 times higher than the initial values ($p < 0.01$). Subsequently, the SBI index did not differ from the initial indicators. The gingival bleeding index (SBI = 1.56 points) of the supporting teeth of patients with composite veneers was 2.2 times higher than the initial values after 14 days ($p < 0.01$). After 3 and 6 months, the gingival bleeding index of the abutment teeth did not differ from the initial value ($p > 0.01$) [6.10].
4. Statistically significant dynamic changes in maximal systolic linear velocity (Vas), mean volume velocity (Gam) and pulse index were noted in the pulp and periodontium of fixed teeth of ceramic and composite veneers based on high-frequency ultrasound dopplerography. The electrical excitation of the pulp after fixation of ceramic veneers averaged $4.56 \pm 0.88 \mu\text{A}$, and 1 year later $4.36 \pm 1.06 \mu\text{A}$. In patients with composite veneers, these values were $4.86 \pm 1.02 \mu\text{A}$ and $4.48 \pm 0.72 \mu\text{A}$, respectively. Electrical irritation of incisors fluctuated between 2.7-6.8 μA , canine teeth - 3.5-6.2 μA , and premolars - 5.3-6.7 μA [4.5.9].
5. During the aesthetic restoration of patients with ceramic veneers, the viscosity of saliva during the first 14 days and 6 months was 0.15-0.19 PaS, and the pH was 6.98-6.74. In patients with composite veneers, these values were 0.16-0.21 PaS and pH 6.97-6.72, respectively [2].

6. Algorithms developed for direct and indirect aesthetic restoration of teeth create new opportunities for successful and high-level fixation of dental veneers in the near and long term [3,7,11].

PRACTICAL RECOMMENDATIONS

1. Before using the direct method of restoration with veneers, it is necessary to assess the condition of the teeth and dentition, in particular the prevalence of caries, the condition of the periodontium, dentition and endodontic status.
2. To determine the state of hemodynamics in the dental pulp and the degree of changes in it, it is necessary to assess the level of hemodynamic parameters: maximum systolic linear velocity (Vas), average volume velocity (Gam) and pulse index.
3. It is advisable to monitor the condition of the pulp through electroodontodiagnostics.
4. To assess the condition of saliva, it is convenient to determine its pH and viscosity.
5. In order to prevent possible complications after restoration with veneers, it is recommended to perform thorough and proper oral hygiene and use mouthwashes designed for oral hygiene.

THE LIST OF PUBLISHED SCIENTIFIC WORKS ON THE DISSERTATION

1. Pənahov N.A., Abdullayeva P.Ş. Vinirlərdən istifadə etməklə hazırlanan restavrsiyaların digər ortopedik konstruksiyalar arasında payı // Azərbaycanın dövlət müstəqilliyinin bərpasının 25-ci ildönümünə həsr olunmuş “Təbabətin aktual problemləri” adlı elmi-praktik konfransın materialları, - Bakı – 2017,- s. 79.
2. Панахов Н.А., Абдуллаева П.Ш. Физико – биохимические параметры ротовой жидкости у пациентов с винирами // Вестник Кыргызско – Российского Славянского университета, 2017 том 17, № 10, с.78 – 81.

3. Pənahov N.A., Abdullayeva P.Ş . Vinir tətbiqi üçün hazırlananan dişlərdə pulpanın vəziyyətinin elektroodontodiaqnostik dəyərləndirilməsi. // Qafqazın stomatoloji yenilikləri, 2018 , № 25 , s . 37 – 42.
4. Панахов Н.А., Абдуллаева П.Ш. Состояние пульпы зубов, препарированных под виниры, // Эндодонтия today, 2018, № 1, с. 4 – 8.
5. Панахов Н.А., Абдуллаева П.Ш. Интенсивность кровообращения в тканях пародонта зубов, препарированных под виниры. // Metabolizm Jurnalı, cild 15, Aprel – İyun 2018 , № 2, s. 35 – 41.
6. Abdullayeva P.Ş. Vinirlərin fiksasiyasından sonra dişəti qanamasının qiymətləndirilməsi, // Azərbaycan xalq cumhuriyyətinin 100 illik yubleyinə həsr olunmuş, “Təbabətin aktual problemləri” adlı elmi-praktik konfransın materialları, - Bakı – 2018,- s. 69.
7. Abdullayeva P.Ş. Vinirlərin istifadəsinə göstəriş və əks-göstərişlər, tətbiqinin uzaq nəticələri. // Sağlamlıq – 2018, № 1 , s . 175 – 181.
8. Панахов Н.А., Абдуллаева П.Ш. Мониторинг состояния полости рта после фиксации виниров // Эндодонтия today, 2018, №1, с.42-47.
9. Abdullayeva P.Ş. Vinir hazırlanması üçün yonulmuş dişin pulpasında hemodinamikanın vəziyyəti, // Azərbaycan təbabətinin müasir nailiyyətləri, 2018 , № 3, s. 46 – 49.
10. Abdullayeva P.Ş. Diş qüsurlarının vinirlərlə bərpasından sonra diş ətlərinin vəziyyəti, // Sağlamlıq – 2018 , № 4, s . 127 – 131.
11. Абдуллаева П.Ш. Электровозбудимость пульпы при препарировании зуба под виниры, // Научный диалог: Вопросы медицины, Сборник научных трудов по материалам XIX международной научной конференции, 15 мая 2019 г., Санкт – Петербург 2019, с . 5 – 7.

The defence will be held on 26 October 2021 at 14:00 at the meeting of the Dissertation council ED 2.05 of Supreme Attestation Commission at Azerbaijan Medical University.

Address: AZ 1022, Baku, A.Gasimzade str, 14 (meeting hall)

Dissertation is accessible at the Azerbaijan Medical University Library.

Electronic versions of dissertation and its abstract are available on the official website of the Azerbaijan Medical University. (www.amu.edu.az).

Abstract was sent to the required addresses on 24 September 2021.

Signed for print: 22.09.2021

Paper format: 60x84 ¹/₁₆

Volume: 35340 characters

Number of hard copies: 30