

# FUNCTIONAL CONDITION OF PERIODONTIUM CIRCULATION AFTER THE PREPARATION OF PULPLESS TEETH UNDER POLYMERIC CROWN DURING PREGNANCY

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**Abstract:** in this work, a comparative analysis of the periodontal blood circulation in the manufacture of polymer dental crowns on the frontal teeth of the upper jaw in pregnant women has been carried out. The study involved pregnant women aged 19 to 28 years. The study was conducted using reoparodonografii on the device RPG-202. At the same time, the venous and arterial blood circulation was studied with an analysis of the magnitude of the eographical index, the amplitude of the fast and slow blood filling, the index of peripheral resistance, the vascular tonus indexes, and the elasticity index. The study was conducted in two control groups: the state of periodontal blood circulation in pregnant women after preparation with intact teeth and in pregnant women after preparation of depulped teeth. Based on the study of the functional state of the periodontal blood circulation after the preparation of the pulsed teeth under the polymer artificial crowns in pregnant women, the conclusion was substantiated that depulping before orthopedic treatment during pregnancy is contraindicated.

**Keywords:** polymeric dental crown, periodontium, pregnancy.

## ФУНКЦИОНАЛЬНОЕ СОСТОЯНИЕ КРОВООБРАЩЕНИЯ ПАРАДОНТА ПОСЛЕ ПРЕПАРИРОВАНИЯ ДЕПУЛЬПИРОВАННЫХ ЗУБОВ ПОД ПОЛИМЕРНУЮ КОРОНКУ ПРИ БЕРЕМЕННОСТИ

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**Аннотация:** в данной работе проведен сравнительный анализ функционального кровообращения пародонта при изготовлении полимерных зубных коронок на фронтальные зубы верхней челюсти у беременных женщин. В исследовании участвовали беременные в возрасте от 19 до 28 лет. Исследование проводилось при помощи реопародонтографии на аппарате РПГ-202. При этом исследовалось венозное и артериальное кровообращение с анализом величины реографического индекса, амплитуды быстрого и медленного кровенаполнения, индекса периферического сопротивления, показателей тонуса сосудов, индекса эластичности. Исследование проводилось в двух контрольных группах: состояние кровообращения пародонта у беременных после препарирования с интактными зубами и у беременных женщин после препарирования депульпированных зубов. На основании исследования функционального состояния кровообращения пародонта после препарирования депульпированных зубов под полимерные искусственные коронки у беременных женщин был обоснован вывод, что депульпирование перед ортопедическим лечением в период беременности противопоказано.

**Ключевые слова:** полимерная зубная коронка, пародонт, беременность.

Denture with polymer crowns (PC) involves the burnishing of a significant layer of hard dental tissue [1,5], which is unsafe in terms of the occurrence of periodontitis [3,4]. In the literature available to us, we did not find information on the functional state of the periodontium after boring of the pulpless teeth during pregnancy [2,6].

The purpose of this study is to substantiate the practicability of preliminary depulping of teeth under the PC in pregnant women by a comparative study of the functional state of the periodontium using reoparodontography.

**Materials and methods.** The study involved 12 pregnant women aged between 19 and 28 years with the intact periodontium, which was made for the medical PC to the front teeth of the upper jaw. In 6 patients, the teeth were non-pulped, and in 6 patients - pulped (a total of 28 teeth).

The functional state of periodontal tissues was studied in dynamics by reoparodontography (RPG) on an RPG-202 apparatus before odontotomy and after 2, 6, 24, 48 and 72 hours after it. RPGs were analyzed by: the ascent time of the ascending part (A), the descent time of the descending part (B), the position of the incisura, the rheographic index (RI), the differential rheogram (DRG), the amplitude of the fast blood filling (AFBF), the amplitude of the slow blood filling (ASBF), the peripheral resistance index (PRI), the vascular tone index (VTI) and the elasticity index (EI). Digital data were processed statistically — the Student criterion was calculated and correlation analysis was performed.

**Results and discussions.** A comparative analysis of RPG data of intact and pulpless teeth before burnishing revealed a number of significant changes in the blood supply and the state of the periodontal vascular network, caused by the removal of the pulp. Almost all basic parameters of reographical curves were changed.

The indicator A, which reflects the compliance of the vascular wall and makes it possible to judge the relative speed of blood flow, did not change significantly after the burnishing of intact teeth ( $p > 0.05$ ). After burnishing of the pulpless teeth, after 2 hours, a significant ( $p < 0.05$ ;  $p < 0.02$ ) decrease was noted in A, after 2 and 6 hours, this indicator decreased by 28.5 and 12.2%, respectively, and did not change significantly in future. Parameter B after the preparation of the intact teeth did not undergo pronounced changes during all periods of observation ( $p > 0.05$ ). After burnishing of the pulpless teeth at all times, B significantly decreased on average by  $7.5 \pm 1.4\%$  ( $p < 0.01$ ). These data indicated a slowing of the venous outflow in the periodontal tissues of the pulpless teeth both before and after drilling. The incisura of the descending part of the RPG decreased markedly in the pulpless teeth 1 and 3 days after burnishing, which indicated a decrease in the tone of the periodontal vessels. RI (periodontal tissue blood filling intensity) after 2 and 6 hours increased by 2.5 and 12.9% and by 6.7% per day (deviations are reliable only for periods of 6 hours - 1 day,  $p < 0.05$ ;  $p < 0.02$ ). In the next 2-3 days, the deviations are insignificant. Already after 2 hours after burnishing, the DRG value significantly ( $p < 0.001$ ) decreased by 30.7%. An increase of this indicator by 9%, noted immediately after depulping, turned out to be statistically unreliable. After 6 hours, 1, 2, and 3 days, the value of DRG increased by 12.4 and 37.2%, respectively ( $p < 0.05$ ;  $p < 0.001$ ).

Thus, the dynamics of the analyzed parameters of blood filling demonstrates significant differences in RPG in the field of intact and pulpless teeth. The relative blood flow rate (a) did not significantly change after burnishing of the intact teeth ( $p > 0.05$ ), and 2 hours after burnishing of the pulpless teeth, it increased by more than 25% compared to the original ( $p < 0.01$ ), which indicates about less elasticity of the vascular wall.

The compliance degree of blood vessels (AFBF) changed unidirectionally after the burnishing of intact and pulpless teeth. The burnishing of an intact tooth caused a decrease in this indicator after 6 hours, which practically remained up to 3 days, which indicates a decrease in the elastic properties of the vessel walls. The ABA of pulpless teeth in the first three study periods were statistically significantly reduced by 25.2; 40.7 and 31.5% compared with intact teeth ( $p < 0.001$ ). On days 1, 2 and 3, ABP of pulpless teeth increased to 5% (deviation is not significant –  $p > 0.05$ ).

Thus, RPG indicators showed biphasic reaction vessels of periodontium: primary marked decrease in elastic properties and their subsequent slight increase, although the dynamics AFBF after the burnishing of intact and pulpless teeth varies (for the first – reduction, for the second – increase).

Similar patterns were found in the analysis of ASBF. After 2 and 6 hours, the periodontal ASBF level in the area of the pulpless teeth was statistically significantly ( $p < 0.05$ ;  $p < 0.01$ ) decreased by 10-32% compared with the control. After one day, the ASBF of the pulpless teeth was within the normal range, on the 2nd day it increased 2 times ( $p < 0.05$ ) and on the 3rd day it decreased by 22% ( $p < 0.001$ ).

Correlation analysis of two indicators - AFBF and ASBF, reflecting arterial inflow and venous outflow of blood showed that between these conjugate values characterizing the functional states of the arterial and venous parts of the microvascular bed, a direct positive reliable correlation and comparable periods of observation can be traced. The closest correlation of AFBF and ASBF was found on the 2nd and 3rd day, when the correlation coefficient  $r$  was 0.58 and 0.66, respectively, at  $p < 0.05$  and  $p < 0.02$ .

Revealed clear patterns in the nature of the periodontal microcirculation disorders of the pulpless teeth, expressed in disorders of the arterial inflow and venous outflow. The same dependence was also observed when studying the changes in other related indicators of RPG-EI, PRI and VTI ( $r = 0.66$ ;  $r = 0.71$  for  $p < 0.02$ ;  $p < 0.01$ ).

PRI of the teeth after 2 hours and 1 day after burnishing significantly increased, respectively, by 25.6 and 29.9% ( $p < 0.001$ ) and by 3 days decreased by 22.1% compared to the PRI of intact teeth ( $p < 0.001$ ). Thus, according to PRI, one can judge the lability of the state of periodontal vessels after burnishing, however, the primary reaction is an increase in PRI - more typical of vessels of pulpless teeth.

The periodontal VTI of the pulpless teeth throughout the entire study period was increased and reached peak levels after 2 hours (an increase of 37.7%), by 3rd day (by 23.7%). Deviations are unreliable ( $p > 0.5$ ).

The study of the dynamics of EI confirms the absence of pronounced changes in the venous outflow in intact teeth after preparation, while in the pulpless teeth against the background of the initial decline in venous outflow in the period up to 3 days there was some activation of this indicator, which did not change significantly in subsequent periods.

The comparison of the peak magnitudes of PRI and VTI on the 2nd day of observation showed the presence of a direct positive and reliable correlation between them ( $r = 0.71$  at  $p < 0.01$ ).

The patterns found by the system and correlation analysis require further research, including on experimental models, which will help to reveal the mechanisms of the primary changes in the microcirculation and periodontium of the pulpless teeth.

The studied RPG indicators show that changes in the periodontium after burnishing in pregnant women correspond to the picture of acute inflammation with severe exudative reaction.

Thus, noticeable changes in the functional state of the vessels occur in the parodontium of the pulpless teeth after burnishing: a decrease in compliance; elasticity of arteriole walls, an increase in the tonic tension of blood vessels, the level of blood supply (by the type of inflammatory arterial hyperemia), worsening of venous outflow, peripheral resistance. These changes in the hemodynamics of the microvascular bed of periodontal tissues can significantly affect the metabolic processes and functional properties of the periodontium, its reactivity, the formation of adaptive and compensatory reactions, contribute to the development of inadequate reactions, inflammatory and dystrophic processes. Disruption of the microcirculatory network and the exclusion of one of the components (pulp) during depulping cause dysfunctions and changes in the reactivity of not only the periodontal tissues, but also the dentition as a whole.

On the basis of the obtained results, it is believed that depulping before deep burnishing of hard tooth tissues under the crown is contraindicated in women during pregnancy.

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