

## **PHYSICAL AND MECHANICAL EVALUATION AT A NEW POLYMERIC COATING VARNISH TO FIXED DENTURES AND IMPROVEMENT OF BONDING METHOD IN THE SYSTEM METAL-POLYMER**

**Yanishen I. V.**

*Doctor of Medical Sciences, Docent,  
Head of Orthopedic Dentistry Department*

**Breslavets N. M.**

*Candidate of Medical Sciences,  
Assistant of Orthopedic Dentistry Department  
Kharkiv National Medical University  
Kharkiv, Ukraine*

Since the beginning of polymers using for aesthetic facing fixed dentures, the main problem was creation secure fastening of facing material to metal framework surface. For many years, scientists have solved many issues such as: improvement of synthetic materials, equipment, mechanical retention to metal framework, chips facing restoration in the mouth and so on. Contemporary acrylic polymers have high physical, mechanical and technological properties, allowing to reduce the rate of complications in orthopedic treatment with combined fixed dentures [5, 6, 7]. But it remains the basic condition – the creation of facing material secure fastening to metal frameworks surface, this adhesive bonding may be reproduced with mechanical, physical or chemical principle, but usually it is combination of these types of bonds [1, 2, 3, 4].

The study purpose is physical, mechanical and technological evaluation of new polymer adhesive-opaque composition, and improve of the bonding method in the metal-polymer system.

Materials and methods. At the prosthetic dentistry Department of HNMU in cooperation with JSC «Stoma» we have developed new polymeric covering varnish, with improved recipe, which consists of powder (suspension copolymer of methyl and butyl esters of methacrylic acid and universal union Bis-GMA) and liquid (demethacrylat trietilenglikol) [8]. For comprehensive inspection of positive characteristics new coating varnish, we conducted series of studies at physical and mechanical indicators.

We have proposed the following methods of retention points creation for fixing aesthetic facing layer in one-piece-cast fixed designs of fixed dentures. On cast metal framework (which made according to the classical method), with a diamond baked disc (thickness 0.4 mm) were marked notches at the angle  $\approx 20^\circ$ - $30^\circ$  to the axis of the crowns to a depth of 0.2 mm. Notches was placed at a distance

of 0.3-0.4 mm from each other. On the occlusal surface of the supporting crowns and intermediate part, caused numerous notches perpendicular to the axis of crown. Thus creating the adhesive system with auxiliary unloading platforms area [9]. The measure determination of adhesive bonding strength of varnish film with a metal surface was performed with universal machine for mechanical in the JSC «Stoma» accredited laboratory.

**Results and discussion.** According to the obtained results, a new coating varnish for fixed dentures at physical and mechanical properties have fully coincide of requirements for these dental materials, the varnish creates a homogeneous non-translucent metal film, and most importantly is an indicator of strength of adhesive bonding between varnish film to metal surface is equal to  $7.2\pm 0.1$  MPa, whereas the lower limit of standardized index equal to 3.5 MPa.

The study of temperature parameters of curing influence at the strength properties of adhesive layer tested to necessity of temperature level is equal to  $170^{\circ}\text{C}$ , which provides in the bond system: coating varnish – polymer.

The study tested samples with mechanical method of connection between metal and polymer was created according to the standard technique using pearl, and our proposed method of adhesive mechanical system for assessing the strength of bonding in the system «metal – coating varnish – polymer»,

The amount of adhesion samples made by our method to  $22.81\pm 0.29$  MPa, which is significantly greater ( $P < 0.001$ ) than  $15.40\pm 0.05$  MPa in the samples produced using standard methods.

**Conclusions.** The using in prosthodontics practice new coating varnish «Sinma M+V», which eliminates the metal transmission through layer of facing polymer and due to the high strength of adhesive bonding to metal surface improves the quality and warranty time of construction using.

At adhesive strength of system «metal – coating varnish – polymer» is simultaneously affected by several different factors: the method of preparation metal framework, the adhesive properties of coating varnish and physical, mechanical properties facing material. Consequently, the creation and comprehensive clinical trial of materials for fixed dentures is the key to quality treatment.

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