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COMPARATIVE CHARACTERISTICS OF DIFFERENT GENERATIONS OF ADHESIVE SYSTEM

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Resume. The widespread use of adhesive systems has influenced many aspects of restorative and preventive dentistry. Attitudes to carious cavity preparation have changed since adhesive systems began to be used instead of mechanical retention of fillings. Their use helps to avoid violation of the marginal seal, the development of secondary caries, depressurization of the filling, and the occurrence of postoperative sensitivity, which determines their important role in aesthetic restorative therapy.

Keywords: adhesive systems, smear layer, total etching, self-etching, scanning electron microscope.

Relevance. Dental adhesives are solutions of resin monomers that make the resin dental substrate interaction achievable. Adhesive systems are composed of monomers with both hydrophilic groups and hydrophobic groups. The former enhances wettability to the dental hard tissues, while the latter allow the interaction and co-polymerization with the restorative material. The chemical composition of adhesives also includes curing initiators, inhibitors or stabilizers, solvents and, in some cases, inorganic filler [1,2]. However, it is necessary to consider the anatomy of tooth. In particular, composition and structure of two main tissues, enamel and dentine, need to be examined in order to understand how they influence adhesive bonds. Details of the composition of these tissues are shown in. The mineralized part of the tooth is a complex structure made of different hard tissues, which have a quite distinct ultra-morphology and composition [3]. This study shows the results of a comparative analysis of various adhesive systems.

Goal: conduct comparative analyzes of the hybrid layer using adhesive systems of 4th, 5th and 7th generations.

Tasks:

1. Find the optimal dental adhesive system.
2. Study the thickness of hybrid layer when using different adhesive systems.

Materials and methods. For the study, 15 intact teeth were selected, extracted for orthodontic reasons. After extraction, the teeth were placed for disinfection and storage in a 10% formaldehyde solution at room temperature. The criteria for inclusion of teeth in the study were: absence of carious lesions of the root, absence of previous endodontic treatment, absence of restorations, absence of non-carious lesions of hard dental tissues.

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Img. 1 – Extracted teeth

Next, the cavities in the teeth were prepared using diamond burs. Teeth were divided into 3 groups. for the first group, a total etching technique was used and a 4th generation adhesive system was used. In the second group, the total etching technique was also used, and the 5th generation adhesive system was used. Samples of the third group were treated with the 7th generation adhesive system without an etching step. After adhesive preparation, all samples were sealed using a universal flowable ligth-cure composite material.

Sections of the teeth were then created using separation discs. Samples were polished using modern polishing systems. All samples were studied during use scanning electron microscope (Zoom x250).

The thickness of the hybrid layer was measured with a calibrated ruler (in micrometers). The results were analyzed and statistically processed in the Statistica 10 program.

Results and discussion. The IV generation of adhesive system showed us the best hybrid layer and properties, even better than V generation and VII generation. V generation also showed good result according to thickness of hybrid layer. VII generation of adhesive system had the thickest hybrid layer compare to the IV and V generation that is not good for attachment.

Img. 2 – SEM photograph (x250) of the hybrid layer using the 4th generation adhesive system

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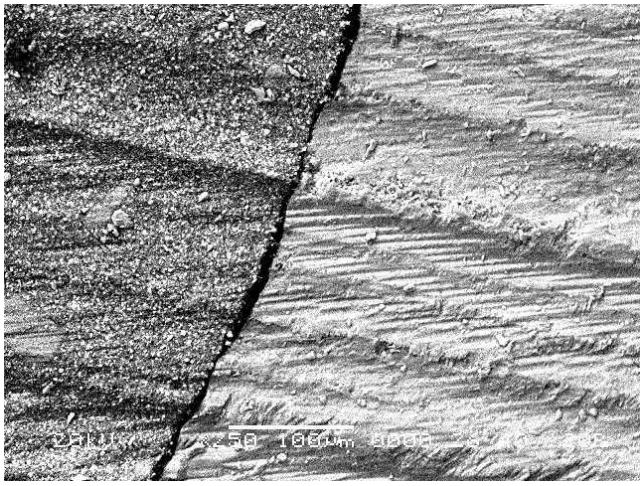
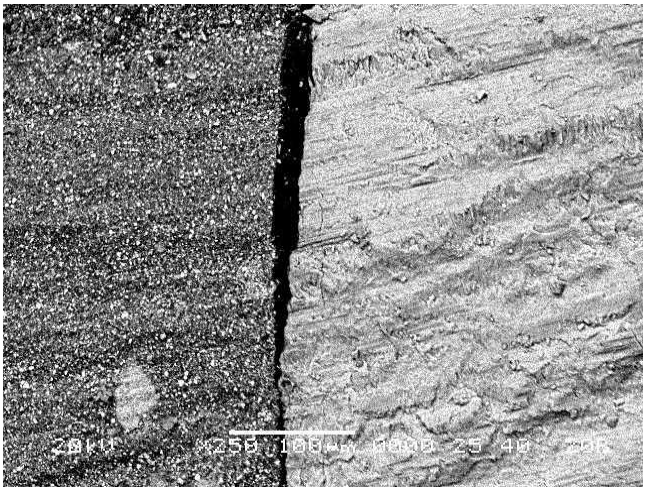


Img. 3 – SEM photograph (x250) of the hybrid layer using the 5th generation adhesive system



Img. 4 – SEM photograph (x250) of the hybrid layer using the 7th generation adhesive system

Conclusions: during the work, it was found that the 4th generation system has the smallest thickness of the hybrid layer. And the thickest is the 7th generation adhesive system.

Now a days in whole of the world dentists are agree that IV generation still has a good result to compare to the others. IV generation just has a one disadvantage that is about steps of using, it has 3 steps as separate components: total etching, prime, and adhesive, that it means dentists should to spend more time to use this generation.

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