ABSTRACT

The natural beauty of teeth makes certain demands on dental materials and treatment methods. One of the most popular methods of treatment of dental fluorosis recently is orthopedic treatment – the use of veneers, which have significant advantages over other types of restoration. Veneers give the tooth the most natural aesthetic appearance and restore the crown of the tooth to its original strength. And also veneers are translucent, so you can achieve a natural appearance even with ultraviolet radiation.

Aim. We set the task – to study the physicomechanical properties of these blocks of cement, in particular, to determine the film thickness of each cement when fixing various orthopedic structures, including veneers.

Materials and methods. The laboratory study of the studied blocks of cement was carried out in accordance with the recommendations of the international ISO standard. All samples were fabricated at t 23±10C and relative humidity 50±10 %.

Cement mixing was carried out strictly according to the manufacturer’s instructions. The quality of each cement was evaluated by film thickness and cement adhesion (tooth-construction).

Conclusions. To fix the veneers used for the treatment of cosmetic treatment and tooth fluorosis, the following blocks of cement were selected: RelyXTM ARC from 3M ESPE, Bifix DC from Voco, Cemion.

The blocks of cement we studied in terms of film thicknesses of cement from different companies meet the requirements of the International Standard ISO and can be used for permanent fixation of veneers (RelyXTM ARC from 3M ESPE, as well as prostheses of other designs (Bifix DC, Cemion).

Key words: teeth, cement, veneers.

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ПОРЯДЖАЛЬНИЙ АНАЛІЗ

ВЛАСТИВОСТЕЙ ЦЕМЕНТІВ ДЛЯ ФІКСАЦІЇ ВІНІРІВ

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СРАВНИТЕЛЬНЫЙ АНАЛИЗ СВОЙСТВ ЦЕМЕНТОВ ДЛЯ ФИКСАЦИИ ВИНИРОВ

Естественная красота зубов предъявляет определенные требования к стоматологическим материалам и методам лечения. Одним из наиболее популярных методов лечения флюороза зубов является ортодонтическое лечение – применение виниров, которые обладают существенными преимуществами перед другими видами реставрации. Виниры предают зубу наиболее естественный эстетический вид и возвращают коронковой части зуба первоначальную прочность. И ещё виниры – светопроницаемые, благодаря чему можно добиться естественности внешнего вида даже при ультрафиолетовом освещении.

Цель. Нами была поставлена задача – исследовать физико-механические свойства цементов, в частности определить толщину пленки каждого цемента при фиксации разных ортодонтических конструкций, в том числе и виниров.

Материалы и методы. Лабораторное изучение исследуемых нами цементов проводили в соответствии с рекомендациями международного стандарта ISO. Все образцы были изготовлены при t 23±10°C и относительной влажности 50±10 %.

Замешивание цементов проводили строго по инструкции фирмы производителя. Качество каждого цемента оценивалось по толщине пленки и адгезии цемента (зуб-конструкция).

Выводы. Для фиксации виниров, применяемых для лечения при косметическом дефекте и флюорозе зубов, были выбраны цементы: RelyXTM ARC фирм ЗМ ESPE, Bifix DC фирмы Voco, цеместон.

Исследованные нами цементы по показателям толщины пленки и адгезии цемента (зуб-конструкция) в отличие от других конструкций, в том числе и виниров.

Ключевые слова: зубы, цемент, виниры.

The natural beauty of teeth makes certain demands on dental materials and treatment methods [1].

A change in the color of the teeth as a result of endodontic treatment, or as a result of various disorders in the human body that occurs during the mineralization of hard tissues of teeth, leads to the occurrence of a disease such as a tooth fluorosis. If these color changes relate to the frontal group of teeth, such a patient goes to the dentist more often than others.

One of the most popular methods of treatment of dental fluorosis recently is orthopedic treatment – the use of veneers, which have significant advantages over other types of restoration. Veneers give the tooth the most natural aesthetic appearance and restore the crown of the tooth to its original strength. And also veneers are translucent, so you can achieve a natural appearance even with ultraviolet radiation.

Of primary importance is the cement, on which veneers are fixed. Blocks of cement are also subject to certain requirements [2, 3].

The materials that will be fixed are evaluated according to generally accepted standards, which reflect the main characteristics of the cement group of materials for fixing: normal batch density (should be kneaded strictly according to the manufacturer's instructions); marginal fit; hardening time; cement film thickness; adhesion to tissues of the tooth, veneer, plastic, etc. [4, 5].

In order to study the basic characteristics of materials for fixing veneers, we chose blocks of cement: RelyX™ ARC – 3M ESPE firms, Bifix DC – Voco firms, and glass-anomalous cement Cemion (Russia).

Aim. We set the task – to study the physicomechanical properties of these blocks of cement, in particular, to determine the film thickness of each cement when fixing various orthopedic structures, including veneers.

Materials and methods. In the available literature, there are a sufficient number of sources in which the authors studied the physicomechanical properties of a number of blocks of cement.

The laboratory study of the studied blocks of cement was carried out in accordance with the recommendations of the international ISO standard. All samples (83) were fabricated at t 23±1°C and relative humidity 50±10 %.

Cement mixing was carried out strictly according to the manufacturer's instructions. The quality of each cement was evaluated by film thickness and cement adhesion (tooth-construction).

The strength of fixation of the prosthesis (including veneer) is the higher, the smaller the film thickness. The thinner the film, the smaller the gap between the veneer (or crown) and the tooth, and therefore, the more secure the fixation and the less the possibility of cementation.

According to literature according to the requirements of the international standard, the film could be 20-40 µm. However, manufacturers of fixing blocks of cement are improving their technology and these figures may currently differ.

A thin film of cement provides an exact marginal fit of veneers (crowns), which improves fixation and the duration of use of this prosthesis.

The methodology for determining the film
thickness of each cement is as follows.

W ere required:

1. Two optical flat, round glass plates of the same thickness (5 mm) and contact surface area (200×10 mm²);

2. A device with which you can apply a force of 147 H (15 kg mass) perpendicular to the surface of the glass, between which the cement.

On the lower surface of the load, there is a metal rod, the surface of which should be horizontal and parallel to the base and have a sufficient size to cover one of the glass plates when it comes in contact with it.

The load device provides the gradual application of the load without any (circular) movements. Each glass plate is fixed to the load device (its platform) with the help of supports that prevent the displacement of the glass plates during the application of the entire weight of the load.

3. Micrometer (with a measurement error of 1 μm).

**Results.** An accurate measurement was made of the thickness of two optically flat glass plates folded together (reading A). Each cement was kneaded strictly according to the manufacturer's instructions; a certain amount of cement mixture was placed in the center of one of the plates and the plate was installed in the fixing supports. Another glass plate was laid with its central part on cement.

During the time specified in the manufacturer's instructions, a load of 147 H (15 kg of mass) was carefully applied perpendicularly to the upper glass plate using a load device and held for 8 minutes. It was ensured that the cement completely filled the space between the plates.

The thickness of 2 glass plates with cement was measured (testimony B). Then the difference: the readings of 2 plates without cement (readings A) and the readings of 2 plates with cement (readings B) – was the thickness of the cement film.

<table>
<thead>
<tr>
<th>Table</th>
<th>The result of determining the film thickness (μm) of blocks of cement</th>
<th>RelyX™ ARC, Bifix DC and Cemion</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>I sample</td>
<td>II sample</td>
</tr>
<tr>
<td>RelyX™ ARC</td>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>Cemion</td>
<td>268</td>
<td>270</td>
</tr>
<tr>
<td>Bifix DC</td>
<td>60</td>
<td>65</td>
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</tbody>
</table>

Then the load device was removed and it was possible to determine visually uniform and complete distribution of cement (to the edges of the glass plates), the spreadability of RelyX™ and Bifix DC cements is quite good. And the film itself between the glasses is extremely transparent. After 60 minutes, the structure of the film did not change, and the glass firmly adjoined to each other.

As for the cement Cemion, the solidification time under the cargo device ranged from 8'-10'. After removing the glasses from under the cargo device, the film between the glasses did not spread to the edges of the plate (the spreadability of the cement is different), and the film between the glass plates is not transparent, and after a while (about 30'-40') cracks appeared.

The results of the study of cement RelyX™ ARC company 3M ESPE showed that the film thickness ranged from 0.006 μm to 0.02 μm. The average film thickness is 0.0208 μm (see table.).

The results of Voco's Bifix DC cement research are as follows: the film thickness ranged from 0.052 μm to 0.65 μm. The average film thickness is 0.275 μm. Thus, taking into account that one of the important points in assessing the quality of cement for fixing is the film thickness, the smallest film thickness of RelyX™ ARC cement from 3M ESPE is 0.0208±0.005, while Voco glass-bimetric cement Bifix DC has a film thickness of 0.0568±0.005, 0.0360 μm more compared to RelyX™ ARC cement.

The film thickness of cement Cemion – 0.271 μm; this is 0.2482 more than RelyX™ ARC cement and 0.296 more than Bifix DC cement.

Therefore, preference may be given to RelyX™ ARC cement from 3M ESPE.

**Conclusions.** To fix the veneers used for the treatment of cosmetic treatment and tooth fluorosis, the following blocks of cement were selected: RelyX™ ARC from 3M ESPE Bifix DC from Voco, Cemion.

A study was made of the physicomechanical properties of these blocks of cement – the determination of the film thickness of each cement when fixing the veneers. For this purpose, a specially made load device was used, with which a force of 147 H (15 kg mass) was applied. The results of the study of blocks of cement showed that the smallest film thickness of RelyX™ ARC cement, which can be used to fix veneers during tooth fluorosis.

The blocks of cement we studied in terms of film thicknesses of cement from different companies meet the requirements of the International Standard ISO and can be used for permanent fixation of veneers (RelyX™ ARC from 3M ESPE, as well as
під час експлуатації адгезивних протезів, діалект, армування, дизайн, армування, клинічна ефективність.

**REFERENCES**


The article was sent to the editor 18.05.2020

DOI 10.35220/2078-8916-2020-35-2-77
УДК:616.314