

THE FIXATION TECHNIQUE OF ARTIFICIAL CROWNS WITH PRELIMINARY PREVENTIVE TREATMENT OF TOOTH STUMP

UDC 616.314-084:616.314-089.29

Received 16.04.2012

E.N. Zhulev, D.Med.Sc., Professor, Head of Prosthetic Dentistry¹;A. Alexy, Dr.Med.Dent.²;S.Yu. Gabysheva-Khlustikova, Stomatologist³¹Nizhny Novgorod State Medical Academy, Minin and Pozharsky Square, 10/1, Nizhny Novgorod, Russian Federation, 603005;²Dental Clinic, Isestraße St., 9, Hamburg, Germany, 20144;³Clinic "Premier-Stomatology", Mira Avenue, 81/1, Moscow, Russian Federation, 129085

The article gives the recommendations for artificial crowns cementing using prophylactic drugs aimed at the prevention of complex cavity of hard tissues of a prepared tooth. Preliminary use of prophylactic drug before final fixation of artificial crowns contributes to deep fluorization of hard tooth tissues, and thus, provides long stable positioning of dentures on prepared hard tissues of natural teeth. Clinical trials carried out showed that along with a precisely poured denture and try-in, the technique provides high caries-resistant of hard tooth tissues under an artificial crown.

Key words: cementing, tooth preventive treatment, artificial crown.

Today there have been amassed many reports on errors and complications developed in different periods after prosthetic repair by fixed prostheses [1, 2]. Among them there is chronic inflammation of marginal parodontium, pulp inflammation, as well as hard tissues caries of prepared tooth under prosthesis. The number of removals of fixed prostheses due to crown decementing ranges from 4 to 50%, and in case of caries process in an abutment tooth — from 23 to 50% of the total complication rate. The most prostheses are removed in the period of 5–6 years [3].

Crown preparation not only reduces the size of tooth stump but also results in qualitatively new state: a tooth loses enamel, and dentin comes in contact with the environment [4].

Cariou process of an abutment tooth can be caused by the decay of cement layer at a coronal edge [5]. Cement dissolution leads to marginal permeability under a prosthesis and bacterial penetration. The authors show the direct connection between caries development and the condition of fixing material under artificial crowns.

Despite close attention to the problem, still there are no any recommendations on cementing artificial crowns aimed chiefly at prevention of hard tissues caries of a prepared tooth.

The lack of protocol of cementing restrains the introduction of preventive measures into practice.

To improve the quality of orthopedic treatment using artificial crowns, we have developed the following technique to prepare an abutment tooth for cementing, the method being based on the use of preventive drugs.

From the variety of these materials we have chosen the following ones: preventive preparation Bifluorid 12 (VOCO,

Germany) and fixing material Ketac Cem Easymix (3M, USA). The choice was made according to recommendations specified by a manufacturer in the instruction.

Bifluorid 12 is Phthorlacum designed for the treatment of dental hypersthenia, для глубокой флюоризации твердых тканей и профилактики кариеса, quick-drying material that is well fixed on dry enamel and dentin. Therefore, the preparation for a long period of time enables to achieve intensive fluorization of the surfaces exposed to topical application, in particular, in common areas of caries localization. Bifluorid 12 forms a water-proof, insulating against thermal and chemical actions, protective film. The purpose of using Bifluorid 12 is the preparation stay on treated surfaces as long as possible for fluorine to have its effect.

Ketac Cem Easymix is glass-ionomer cement designed for fixation of inlays, crowns, and crown dentures made of metal and metal-ceramic. The preparation combines the advantages of classical glass-ionomer cement and easy-to-use powder granular form refining its wetting property that makes it possible to batch the preparation faster, with minimum dust. The advantages of this cement are proved by over 25-year recorded clinical experience of usage, and as has been already said, a wide range of use. It is biocompatible with tooth tissues, nontoxic, and has prolonged defluorination. It has the following characteristics:

Chemical adhesion to tooth tissues: cement does not require absolute surface dryness, sterilization, or bonding;

the coefficient of cement thermal expansion is close to the coefficient of thermal expansion of hard tooth tissues that reduces the risk of micro-cracking and marginal breaking off;

For contacts: Zhulev Evgeniy Nicolaevich, tel. +7 905-661-57-22; e-mail: hrustalev54@mail.ru

biocompatibility with hard tooth tissues, non-toxicity; prolonged defluorination; high compression strength and wear resistance providing prosthesis long life.

The protocol of application of the mentioned preparations has been developed on the basis of clinical trials carried out in orthopedic treatment of patients with fixed prostheses, and looks like this:

1st stage — the treatment of prepared tooth stump.

1. Prepared tooth surfaces are cleaned by synthetic brushes with polishing paste. The paste is washed by distilled water, and a tooth is thoroughly dried by air.

2. A bottle with Phthorlacum Bifluorid 12 is to be shaken before usage. Solid particles should be well dispersed, and two metallic balls in a bottle facilitate the process of shaking. The preparation should be fluid, so that after shaking it could easily flow out of the bottle. Otherwise, the preparation is to be diluted by a suitable solvent.

3. Bifluorid 12 is taken by a brush or Pele Tim — sponge balls — and applied on a tooth surface.

4. Phthorlacum is applied on a tooth surface for 10–20 s and air-dried.

5. The treated tooth is covered by a temporary crown. Before the procedure, on inner surface of a temporary crown there should be prepared the area for applying Phthorlacum and cement for temporary fixation. It can be done either when modeling a crown by applying 2–3 layers of insulating lacquer of the stamp of tooth model, or by milling an inner surface removing the needed plastic layer.

When properly used Bifluorid 12 is left on a treated surface within a few days, while a final denture is being made. In case of hypersensitivity of the neck and margins of the crown or in similar indications, the treatment is to be repeated two or three times with 7-day interval. Before lacquer application the surfaces are just dried, and again topical application is performed.

2nd stage — artificial crown cementing.

1. The prepared tooth surfaces are cleaned by synthetic brushes using polishing paste. The paste is washed by distilled water, and a tooth is thoroughly dried by air.

2. Before cementing a tooth by fixing material Ketac Cem Easymix, the gingiva should be retracted using a thread. It is required for clearer visualization of preparation borders. The exposure of the joint of the artificial crown edge and hard tooth tissues makes the process of cementing more controlled. Moreover, the insertion of retraction thread in dentogingival groove is necessary to prevent the fixing material from entering the gingiva. Thread size is selected in accordance with gingival biotype. The thread of minor diameter is the most preferable. The thread is to be inserted

wet in dentogingival groove, i.e. preliminary wet with distilled water.

3. The recommended fluid-powder ratio for cement mixture is to be 3.8:1 which is equivalent of one powder spoonful and two drops of fluid.

4. Metallic or plastic spatula should be used for mixing. The powder should be added to fluid by one portion. The blend should be mixed till the mixture is homogeneous.

5. A thin cement layer is put inside a crown and applied on a tooth. Avoid overfilling of a crown. Hydrostatic pressure in close proximity to a crown can cause pulp irritation or “swabbing effect”, when a crown does not completely placed on an abutment tooth.

6. After cement hardening, the surpluses are removed by Heidemann spatula and/or a probe about 6–8 min after the start of mixing.

7. Cementing time:

mixing — 30 s;

working hours including mixing is 3 min;

hardening from the start of mixing takes 7 min. The increase of working hours results in the loss of enamel-dentin contact.

The carried out clinical trials of the technique have shown that combined with accurately made and fitted prosthesis the technique provides high caries-resistant of hard tooth tissues under an artificial crown.

Conclusion. Cementing of fixed prostheses is an essential part of orthopedic treatment. Adherence to fixation protocol is the guarantee of a long life of an artificial crown or a dental bridge. Preliminary use of prophylactic drug before final fixation of artificial crowns contributes to deep fluorization of hard tooth tissues, and thus, provides long stable positioning of dentures on prepared hard tissues of natural teeth.

References

1. Trezubov V.N. *Stomatologiya — Dentistry* 1996; 3: 485–487.
2. Zhulev E.N. *Metallokeramicheskie protezy* [Metal-ceramic prostheses]. Nizhny Novgorod: Izd-vo NGMA; 2007; 288 p.
3. Gritsay I.G. *Inst Stomatol — Stomatological Institute* 2004; 1: 78–79.
4. Garazha S.N. *Povyshenie rezistentnosti preparirovannykh zubov s pomoshch'yu novykh gidroksiapatitsoderzhashchikh kompleksov (eksperimental'no-klinicheskoe issledovanie)*. Avtoref. dis. ... dokt. med. nauk [The increase of resistance of prepared teeth using new hydroxyapatite containing complexes (experimental and clinical study). Abstract of Dissertation for the degree of Doctor of Medical Science]. Moscow; 2000.
5. Ryakhovskiy A.N., Voronkov V.V. *Stomatologiya — Dentistry* 2000; 5: 48–50.
6. Smith D.C. *Kvintessentsiya — Quintessence* 1996; 5(6): 25–45.