Solving the problem of postoperative complications of Class I restorations

By Dr. Valentina Kondratieva, Russia

Introduction
In the recent years there has been a rapid improvement in the physical properties of the composite materials and adhesive systems that certainly helped dentists to improve the quality of their work. Shrinkage of composite materials today is lower than before, their strength and wear resistance have increased, and aesthetic properties are comparable to the aesthetics of natural teeth. But, unfortunately, the problem of the polymerisation stress has remained to the present time. Shrinkage of the composite material during polymerisation causes stress in the composite, the adhesive layer and the tooth tissues. The intensity of the stress depends on such factors as cavity configuration (C-factor), the physical properties and composition of the composite material. The result of the polymerisation stress is a number of complications - micro leakage, post-operative sensitivity, cracks in the tooth, subsequent secondary caries and others. To prevent such problems during performing restorations with classic composite materials it is recommended to use flowable composites as an adaptive layer (creating the “elastic cavity wall”), as well as perform placement of the composite in small portions during filling the cavity ([incremental technique]) [1]. Such approach is familiar to the dentists but require a lot of time for restoration of each tooth as during the work the dentist has to insert into the cavity and adapt multiple number of layers of the composite material. That is why bulk fill materials are increasingly popular. They help solve the problem of polymerisation stress and reduce the amount of time spent on the restoration of the tooth. One of such materials, Filtek™ Bulk Fill Posterior Restorative, is used in dental practices worldwide due to its ability to make the adhesive procedure more predictable and will provide a dry working field and retraction of the soft tissues surrounding the tooth. But in this case the application of a clamp for fixing the rubber dam material has certain difficulties – a tooth 4.7 has a low clinical crown and there is no possibility to rigidly fix the clamp on it. There is a simple solution to this problem: 36% phosphoric acid is applied on the area near the gingiva on the buccal wall of the tooth in two places and after 5 seconds washed out with plenty of water, then a piece of the composite material is placed on the surface (composite sandwich), which after the polymerisation will perform the function of holding the clamp on the tooth. After the placement of the rubber dam all possible leaks are sealed with gingival protector (Fig. 2).

Clinical case
The patient came to the dental office with complaints about increased sensitivity of the posterior teeth on the lower jaw on the right while eating sweet substances. During the examination the poor quality restorations of teeth 4.6, 4.7 with micro leakage, numerous cracks and color change along the border between the restoration and the tooth were found (Fig. 1). To minimise polymerisation stress, save time during the treatment without compromising the strength and the wear resistance of the restoration it was decided to make a direct restoration of the teeth with Filtek™ Bulk Fill Posterior restorative composite material. Isolation of the working field When working with composite materials the use of the isolation will help to make the adhesive procedure more predictable and will provide a dry working field and retraction of the soft tissues surrounding the tooth. But in this case the application of a clamp for fixing the rubber dam material has certain difficulties – a tooth 4.7 has a low clinical crown and there is no possibility to rigidly fix the clamp on it. There is a simple solution to this problem: 36% phosphoric acid is applied on the area near the gingiva on the buccal wall of the tooth in two places and after 5 seconds washed out with plenty of water, then a piece of the composite material is placed on the surface (composite sandwich), which after the polymerisation will perform the function of holding the clamp on the tooth. After the placement of the rubber dam all possible leaks are sealed with gingival protector (Fig. 2).

Preparation step
Old restorations were removed with the diamond burs (diamond particle size 120-140 microns, the universal carbide bur (SS-White FG-1702SL) was used for preparation of cavities. Pre-operative sensitivity have been given as reasons for this. Although Filtek™ Bulk Fill Posterior Restorative is very flowable upon extruding, the author also prefers to apply a layer of flowable composite prior to placing the composite material in the cavity, as the composite will flow in the remaining of the composite was polished with the SS-White 12-sided bur (Fig. 3) and then adaptation of the flowable composite was placed on the dentin in an amount of about 0.5-0.7 mm and polymerised afterwards (Fig.7).

Composite restoration
The further restoration was performed with Filtek™ Bulk Fill Posterior Restorative medium shade (Shade A2). The product has high strength and wear resistance, good polishing, self-adhesion, it allows to perform the increment up to 5 mm and has low modulus of elasticity, which is ideal for development of postoperative complications of Class I restorations. [2] Filtek™ Bulk Fill Posterior Restorative is polymerised directly from the capsule in one layer (Fig. 8), and then adaptation of the upper layer was performed with the large ball burnisher bur (Fig. 9) to make an occlusal surface. Any step of the restoration was performed with thin LM-Aplipiga and LM-Fissura tools using the technique of direct carving (Fig. 10-13). The excess of the composite material from a tooth-restoration bumer was removed with a synthetic fiber brush, slightly moistened with the modelling resin (Fig. 14). Polymerisation of the composite material was made for 20 seconds (Fig. 15). With the power of curing light of 800 mW/cm², this time is sufficient for the full polymerisation of Filtek™ Bulk Fill Posterior Restorative at the entire depth of the cavity.

Finishing of the restoration
On the Fig. 16 and 17 the restorations before finishing and polishing were shown. In this case, the dovetail removal, the composite should was removed from the buccal wall of the tooth using an ultrasonic tip for removing dental plaque, and the remaining of the composite was polished with the SS-White 12-sided carbide bur during finishing and occlusal adaptation of the restoration (Fig. 16). Finishing and polishing of the restoration to a “dry-light” were performed with a two-stage polishing system Sof-Lex™ Spiral Wheels (beige and white).

Conclusions
With this technique using bulk fill nanocomposite materials such as Filtek™ Bulk Fill Posterior the author has less post-operative sensitivity issues than with multi-layer composite placement. In addition, using the material in one layer up to 5 mm allows dentists to significantly reduce the amount of working time without sacrificing the quality of work.

Full list of references is available from the publisher.

Dr. Valentina Kondratieva,
leading specialist in aesthetic dentistry, Hummingbird Dental Practice, the author of EVRICA Project, successful practicing dentist with over 13 years of experience. Owner of the patents in the field of dentistry and developer of “one opacite” technique of aesthetic anterior teeth restoration with “Filtek™ Z250” nanocomposite material. Over the past 5 years conducted more than 300 educational events in Russia and abroad.
e-mail: wax.vs@yandex.ru