Solving the problem of postoperative complications of Class I restorations

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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 polymerization stress has remained to the present time. Shrinkage of the composite material during polymerization causes stress in the composite, the adhesive layer and the tooth tissue. 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 polymerization 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 clinician has to inject 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 polymerization 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 and daily helps us to do a better job.

Clinical case

The patient came to the dental office with complaints about increased sensitivity of the posterior teeth of the lower jaw on the right while eating sweets. During the examination the poorest 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 minimize polymerization 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 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 shoulder), which after the polymerization 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 is 2-140 microns, the universal carbide bur (3S White® SSF FG 7026) was used for preparation of carious dentin, enamel walls of the cavities were treated with fine-grain diamond burs (diamond particle size is 25 microns) and polished with a two-stage polishing system: Sof-Lex™ Spiral Wheels (beige and white).

Flowable composite use

Many authors describe the use of flowable composite underneath posterior restorations. Improved adaptability and contribution to postoperative sensitivity have been given as reasons for this. Although Filtek™ Bulk Fill Posterior is very flowable upon polymerizing, the author also prefers to apply a layer of flowable composite prior to placing the composite material in order to prevent polymerization stress [1]. Filtek™ Bulk Fill Posterior therefore was flowed underneath the flowable composite using Filtek™ Bulk Fill Posterior 20 seconds (Fig. 15). With the power of curing light of special form this time is sufficient for the full polymerization of Filtek™ Bulk Fill Posterior at the entire depth of the cavity.

Isolation of the working field

The X-Ray showed that the material of the restoration after polishing is shown on the Fig. 16 and 17 the restorations before finishing and polishing (Fig. 10). Metallurgical removal, the composite shoulder 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 1-sided carbide bur during finishing and occlusal adaptation of the restored tooth. Finishing and polishing of the restoration to a "drylight" were performed with a two-stage polishing system: Sof-Lex™ Spiral Wheels (beige and white).

Final result

The further restoration was performed with Filtek™ Bulk Fill Posterior Restorative material. The product has high strength and wear resistance, good polishing, self-adhesive, it allows placing an increment up to 5 mm and has low modulus of elasticity, which allows the development of postoperative complications [3]. Filtek™ Bulk Fill Posterior was placed in the cavity properly from the capsule in one large portion (Fig. 9), and then adaptation of the upper layer was performed with the large ball burnisher (Fig. 9) to make an occlusal surface.

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 [6]. 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.

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Fig. 1. Initial clinical situation. Teeth 4.6, 4.7 have unsatisfactory restorations with polymerization stress has remained to the present time. Shrinkage of the composite material during polymerization causes stress in the composite, the adhesive layer and the tooth tissues.

Fig. 2. Isolation of the working field with the latex curtain.

Fig. 3. Old restorations were removed from the tooth 4.6 with LM-Applica tool and then polymerized for 10 seconds.

Fig. 4. Selective etching of the enamel with 36% phosphoric acid for 10 seconds.

Fig. 5. Application of Single Bond Universal adhesive.

Fig. 6. 10-second polymerization of Single Bond Universal adhesive.

Fig. 7. Application of Filtek™ Bulk Fill Flowable composite as an adaptive layer on the bottoms of the cavities.

Fig. 8. Application of Filtek™ Bulk Fill Posterior nanocomposite as an adaptive layer on the borders of the cavities.

Fig. 9. Adaptation of the top layer of the Filtek™ Bulk Fill Posterior with a ball bur.

Fig. 10. Shaping the distal buccal cusp of the tooth 4.6 with LM-Applica tool.

Fig. 11. Shaping the mesial lingual cusp of the tooth 4.6 with LM-Applica tool.

Fig. 12. Shaping the fillers of the tooth 4.6 with LM-Applica tool.

Fig. 13. Position of the LM-Flusso tool during the process of creating the tooth shape.

Fig. 14. Removal of the excess material from the borders of each restoration with synthetic fiber brush.

Fig. 15. Curing of the composite for 20 seconds with Elipar™ S10 Curing Light.

Fig. 16. Restorations of the teeth 4.6, 4.7 before finishing.

Fig. 17. Restorations of the teeth 4.6, 4.7 after 10 months.