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Restorations with Bulk Fill restorative system: case report

Restaurações com sistema restaurador Bulk Fill: relato de caso

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ABSTRACT

Bulk Fill Composite resins are restorative materials that present low tension and polymerization shrinkage, allowing them to be inserted in a single increment of up to 4 mm of thickness, in a restorative cavity. This paper aims to report a clinical case of restorations done on posterior teeth with Bulk Fill restorative system, using selective acid-etching with self-etch adhesive system. Patient, male, 24 years old, presented a carious lesion on the occlusal surface of dental element 37 and an occlusal unsatisfactory amalgam restoration, on element 36. A restorative treatment with Universal Bond 3M / ESPE and bulk fill composite resin (3M / ESPE) was done. According to the case described, it was possible to observe that the materials and techniques used restored the form and function of the teeth involved, preserving pulp vitality with a satisfactory aesthetic result. The bulk fill resins employed offer practicality and decrease clinical time, with satisfactory clinical applicability in the aesthetic and functional rehabilitation of posterior teeth.

Indexing terms: Dental Aesthetic. Dental materials. Permanent dental restoration.

RESUMO

Resinas compostas do tipo Bulk fill constituem um material restaurador que apresenta baixas tensão e contração de polimerização, podendo ser inserido em incremento único, de até 4mm de espessura, numa cavidade. Este trabalho objetiva relatar um caso clínico de restaurações em dentes posteriores com o sistema restaurador Bulk fill, empregando o condicionamento ácido seletivo com sistema adesivo autocondicionante de emprego universal. Paciente, sexo masculino, 24 anos, apresentava lesão de cárie na face oclusal do elemento dentário 37 e restauração oclusal de amálgama insatisfatória, no elemento 36. Sendo proposto e realizado tratamento restaurador com Single Bond Universal 3M/ESPE e resina composta bulk fill (3M/ESPE). De acordo com o caso descrito, foi possível observar que os materiais e técnica empregados restituíram forma e função dos dentes envolvidos, preservando a vitalidade pulpar com estética considerada satisfatória. As resinas bulk fill empregadas oferecem praticidade e diminuição do tempo clínico, tendo aplicabilidade clínica satisfatória na reabilitação estética e funcional de dentes posteriores.

Termos de indexação: *Estética dentária. Materiais dentários. Restauração dentária permanente.*

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INTRODUCTION

Composite resin can be considered as the most studied restorative material in the last decade. With the purpose of improving its mechanical and aesthetic properties, not only the quantity of filler particles, but also its format, composition and organic matrix distribution, suffered alterations optimizing aesthetic, biological and functional results [1].

However, some disadvantages, such as polymerization shrinkage, can still be observed and contribute to the decrease in longevity of the restorations, leading post-operative sensitivity and compromising marginal integrity [2,3] Polymerization shrinkage is a result of the movement and approach of the monomers amongst each other during the formation of the polymer chain. The greater the degree of conversion of monomer to polymer, the greater the polymerization shrinkage [4].

As a way of avoiding the clinical consequences of polymerization shrinkage, incremental filling techniques normally are preferred over the single increment method. Although the incremental technique can be important for adequate light penetration, some limitations are reported, such as the possibility of creating gaps or adhesive failures between layers, and increase of clinical time due to the necessity of light curing each increment [5].

Bulk fill composites present chemical alterations to the structure of the organic matrix and are an option to restore posterior teeth with a single-increment of 4 to 5 mm of thickness. Lower viscosity and increased molecular weight monomers, compared to the traditional methacrylate, sum themselves to photo-polymerization modulator groups, which interact with canphorquinone prolonging the pre-gel phase and allow greater polymerization sensibility at the moment of photo-activation; adequate the degree of polymer conversion; lower stress; reduced polymerization shrinkage; and adequate marginal sealing [6-8].

This paper aims to report a clinical case of posterior teeth restored with use of Bulk fill restorative system, associated to selective acid-etching and self-etch universal adhesive system.

CASE REPORT

Male patient, 24 years old, complained of sensitivity on the lower left molars. With medical history, clinical and x-ray exams (figure 1) occlusal carious lesion on dental element 37 and unsatisfactory amalgam restoration on dental element 36 were detected (figure 2). Proposed and accepted the treatment plan to restore the two teeth with bulk fill composite resin, proceeded to the removal of the carious lesion and pre-existing restoration with carbide bur (#2) and diamond burs (#1014 e #4145), in low and high rotation respectively, under abundant refrigeration and rubber dam isolation, defining a cavity of approximately 5mm and 3mm of depth (figure 3).

Sequentially prophylaxis with pumice and water; selective etching with 37% phosphoric acid (3M/ESPE) only on enamel (T=30sec) (figure 4); rinsing with water and air spray, for the same amount of time and air-drying were carried out. Following that, with aid of a microbrush (Microapplicator Cavibrush, FGM), Single Bond Universal (3M/ESPE) adhesive system was actively applied (T=20sec). Air spray was applied and then light-curing was done with LED Valo (Ultradent) (T=10sec), according to the manufacturer's instructions (figure 5).

A single increment of flow composite resin (Filtek Bulk fill flow, 3M ESPE) was injected into the cavities with purpose of filling the entire internal uneven (figure 6). After light curing, with help from a spatula the restorative composite that can be sculpted was inserted (Filtek Bulk fill, 3M ESPE). The sculpture of the occlusal face was done with spatula and sculptor SD2 (Golgran) (figure 7), followed by light activation (T=40sec). The technique was conducted separately for each tooth.

Figure 1. Periapical radiographic image.

Figure 2. Initial clinical aspect

Figure 3. Cavity.

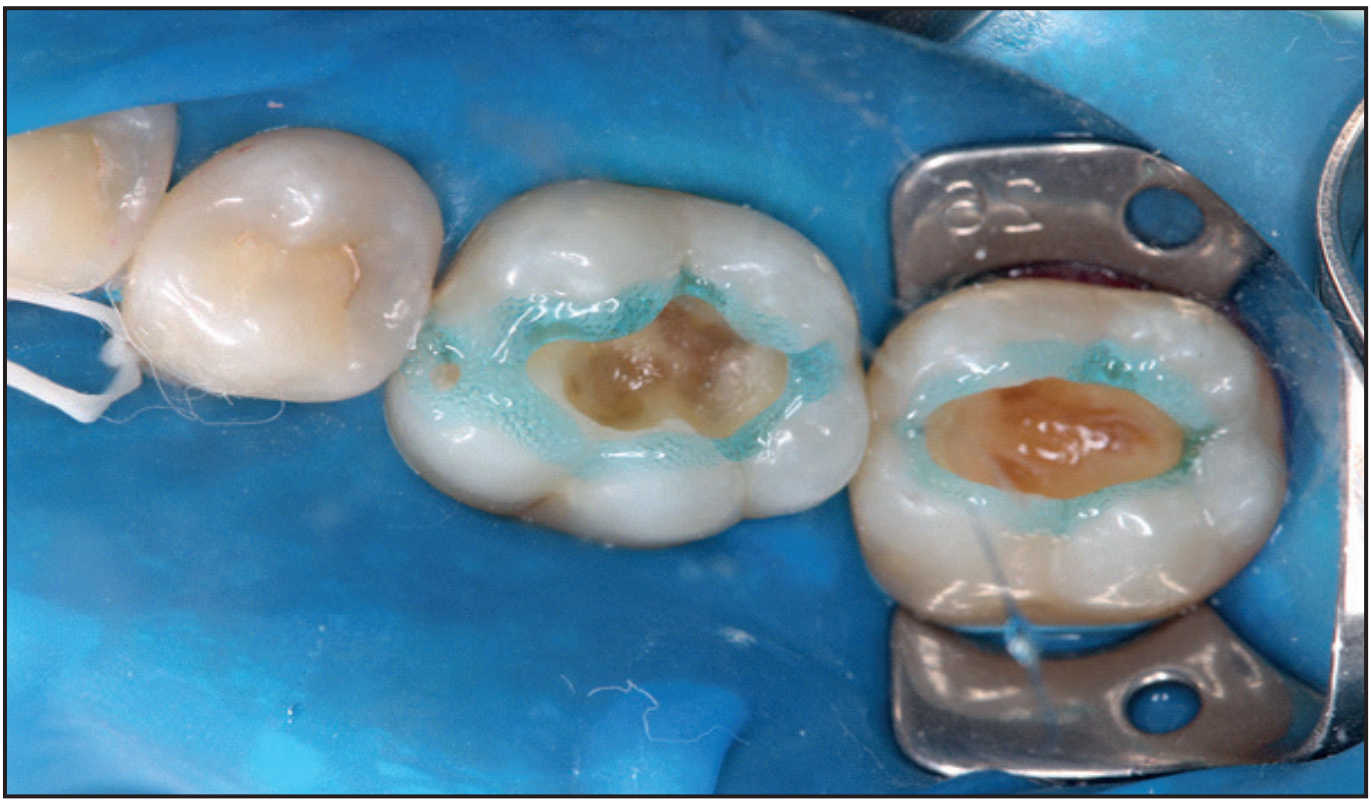

Figure 4. Selective acid-etching of enamel.

Figure 5. Application of Single Bond Universal adhesive system (3M ESPE).

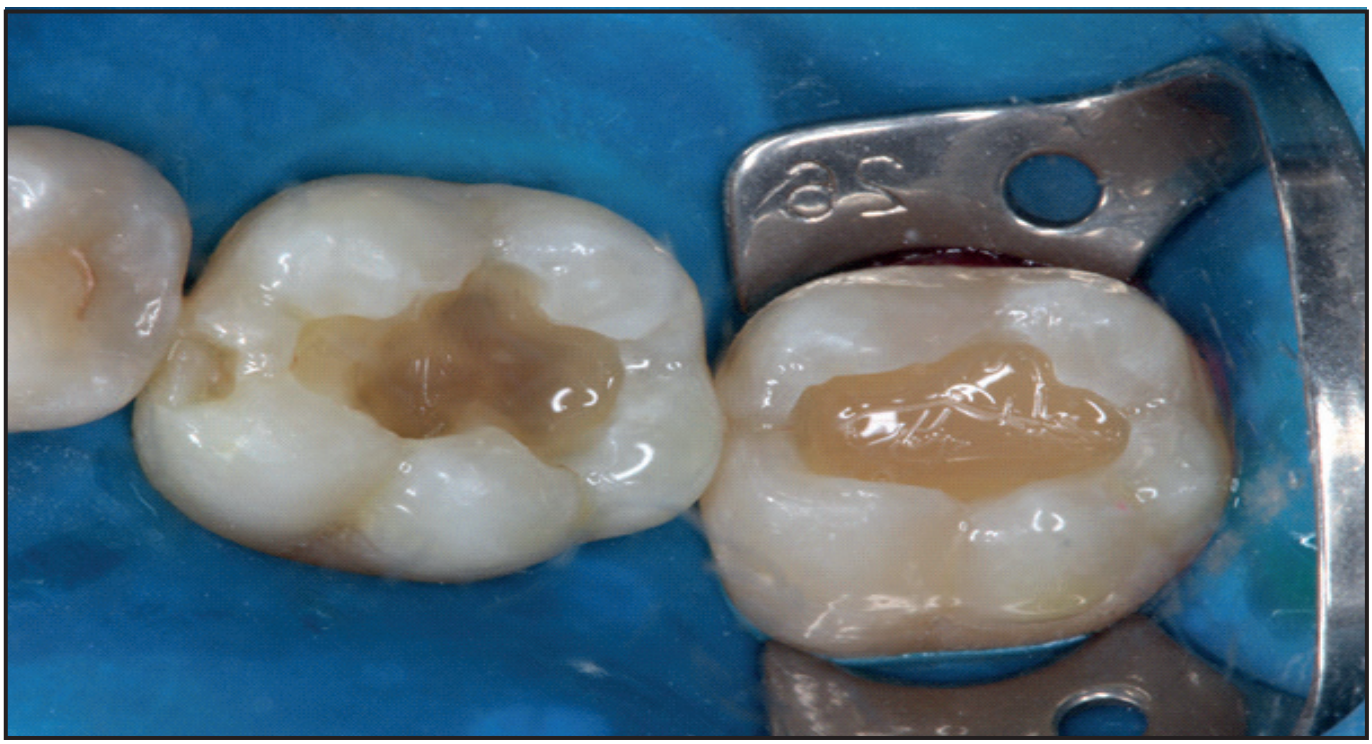

Figure 6. Flow composite resin on 37 (Filtek *Bulk fill,* 3M ESPE).

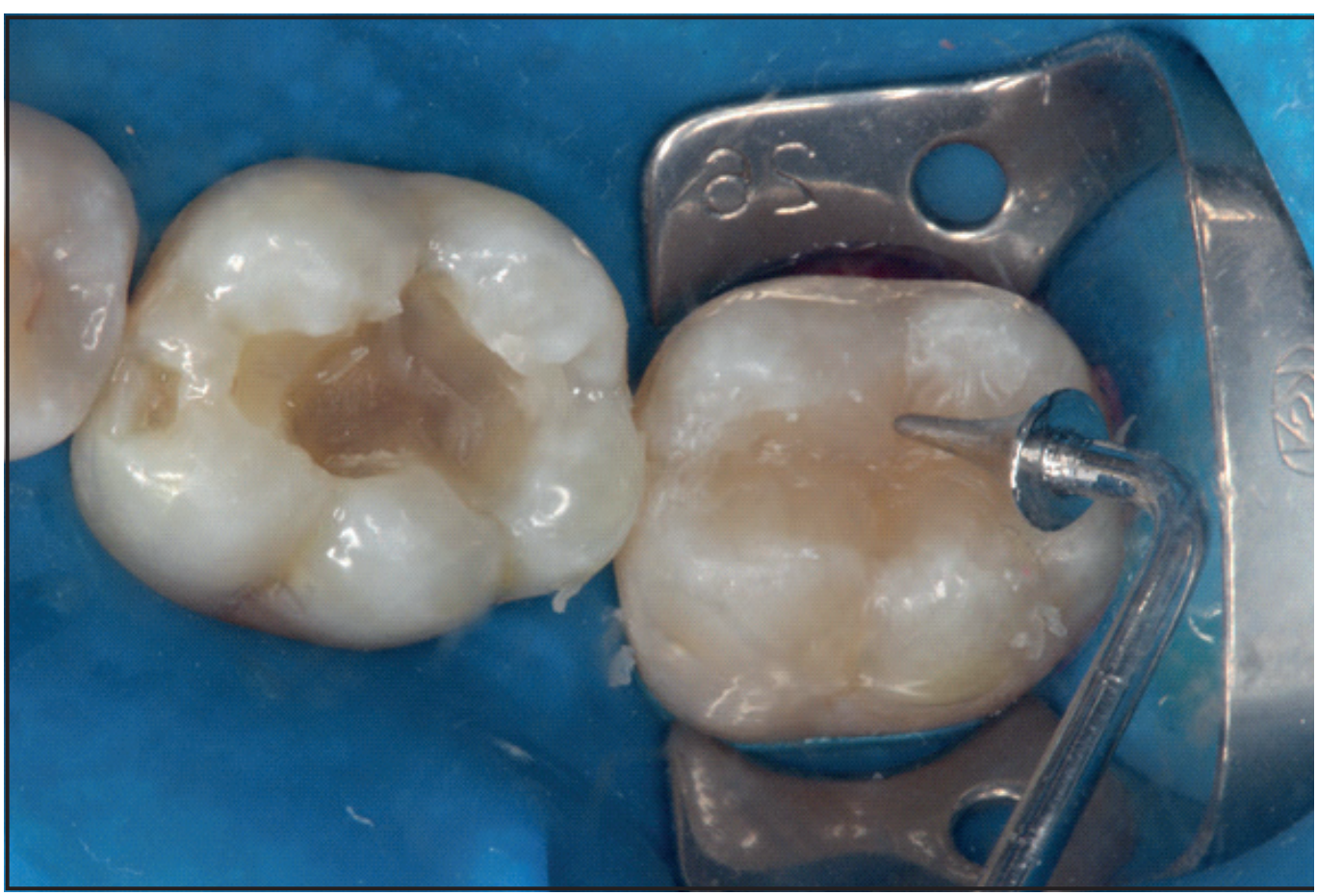

Figure 7. Use of sculptor SD2 (Golgran).

The rubber dam isolation was removed and occlusal mapping was done with carbon paper (Bausch), with posterior functional occlusal adjustment, finishing with diamond bur 3118 FF (KG Sorensen, Brazil) and polishing with abrasive silicone tip with a flame shape (Enhance Dentsply) to obtain the final clinical aspect (figure 8).

DISCUSSION

New materials and alternative restorative techniques are being studied and applied, aiming to reduce the negative effects of polymerization shrinkage and to provide better adaptation of the material to the cavity walls, better sealing and to increase the lifespan of restorations with composite resins [9].

Composite resins, nowadays, are the material of choice for direct restorations in both posterior and anterior teeth, presenting advantages such as faster execution and excellent aesthetic results [10]. On the other hand, polymerization shrinkage is mentioned as a disadvantage with greatest clinical relevance. This characteristic is inherent to resinous materials, which can generate rupture of the adhesive interface, which causes marginal infiltration [5].

Shrinkage happens when monomers from the resin, during polymerization, approximate to each other and establish covalent bonds between each other, causing a volume reduction [10]. To minimize these effects composite resins that present lower degree of polymerization shrinkage were developed and they allow the incremental technique to be dismissed. These resins are known as bulk fill resins, which are presented in two different consistencies: low viscosity (flow) and medium viscosity (can be sculpted) [11]. In this case, the larger cavity was restored using flow associated with the sculptable resin and the smaller cavity was restored only with the sculptable bulk fill resin in a single increment.

A limitation of the bulk fill resins is their monochromaticity and high translucency, for better penetration of light, which negatively influences the

Figure 8. Final clinical aspect.

aesthetic of the restoration. A systematic review on bulk fill composites states that literature is inconsistent when it comes to determining the thickness of the increment for its complete polymerization. Flow type bulk fill composites would be adequate for narrow and deep cavities and Class I cavities that are more than 4mm deep. Its viscosity allows for better adaptation in spaces with hard access due to its flow property. On the occlusal surface of bigger cavities, in contrast, resistance to wear and fracture is important. The thicker consistency can also help in obtaining a good anatomical reconstruction. Polymerization shrinkage tests indicate inconsistency due to variations in the configuretion of the tests. However, its clinical relevance is not clear and the influence on the interface also strongly depends on the adhesive system used [12,13].

In this case a universal adhesive system was used, which presents the co-polymer from the vitrebond, and the capacity of dentine etching. This way, etching with 37% phosphoric acid was only done on enamel, avoiding post-operative sensitivity [14].

Self-etching adhesives have the capacity of decreasing post-operative sensitivity caused by the incomplete infiltration of resinous monomers in dentine tubules. Studies demonstrate that the bond strength of this adhesive system when applied on damp or dry dentine is similar, which indicates a grand advantage for the use of this material. Selective acid-etching of enamel is key to improve bond strength [14].

With regards to the behavior of bulk fill composite resins in controlled clinical trials, there are only medium term results, with few clinical trials that explicit depth and size of the cavities [13]. It can be considered that, by the dynamic of science, more clinical studies that evaluate specific details of the use of this restorative mode, are important to completely explore the benefits.

CONCLUSION

According to the described case, it was possible to observe that the materials and techniques employed restored form and function of the teeth involved, preserving pulp vitality with satisfactory aesthetic. The bulk fill composites employed offered practicality and reduction in clinical time.

Collaborators

MAB COSTA, clinical care and writing the text. JRS MAIOR, literature revision. RP GUIMARÃES and DPTS COSTA, writing the text. PF MENEZES FILHO, first revision of the text. CHV SILVA, orientation, clinical care and correction of the final text.

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