

# Six-Year Followup of a Semi-direct, Large Posterior Restoration

## INTRODUCTION

Composite resin is a versatile material that dentists use to solve numerous clinical situations. It is indicated for restorations of anterior and posterior teeth with small or large cavities. It is also used for aesthetic procedures such as diastema closures; composite veneers; restoring fractured teeth; and many other situations, such as core build-ups and the fabrication of attachments used with dental aligners. Each clinical situation demands several types of composite resin that present diverse characteristics and properties according to their compositions.<sup>1</sup> A flowable composite with a low filler content can be suitable for a minimally invasive occlusal cavity preparation<sup>2</sup> but inadequate for larger cavities because of its mechanical properties.<sup>3</sup> The use of a bulk-fill composite resin may be too translucent when restoring a Class III cavity. Thus, when planning a case, the clinician must evaluate and choose the material according to the characteristics desired in the final restoration. When this is handled correctly, it will have a positive impact on the longevity of the restoration. Another solution would be to use a composite resin system suitable for a wide variety of clinical situations. These include good handling, low polymerization shrink-



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wear, abrasion, erosion, and caries being the predominant causes.<sup>4</sup> Direct-technique restorations may not be the most appropriate choice in these situations because of the technical difficulty of creating an adequate shape due to the large area to be reproduced. Therefore, many dentists prefer to use an indirect technique when faced with the reconstruction of the tooth after removing large cavities. The use of indirect partial restorations to preserve as much of the remaining tooth structure as possible is a growing trend in current dentistry based on minimally invasive dentistry. A traditional crown involves more invasive preparation resulting in greater removal of dentinal tissue compared to onlays and overlays. Composite resin is widely used in the fabrication of partial restorations,<sup>4</sup> but not every system is indicated for this purpose. A high-wear resistance is an important feature of the composite, especially for large restorations in posterior regions. Extensive

cavities in posterior teeth usually involve areas subjected to great masticatory loads. Maintaining their shape becomes particularly important if the occlusal contacts are located on the restoration surface. Occlusal contacts are important not only from a functional point but also to maintain the stability of the tooth position, as are proximal contacts. Wear results from the chemical and/or mechanical action on the restoration surface and leads to its deformation, damage, or loss of substance.<sup>5</sup> As different composite resins have different wear resistances,<sup>6</sup> a meticulous choice must be considered when facing challenging situations like this.

The GrandioSO (VOCO) composite is a nanohybrid composite with a high filler content (89% by weight) that gives this product good mechanical properties under static and dynamic compression tests as well as good water sorption behavior even after chemical degradation with different agents.<sup>7</sup> GrandioSO's flexural strength stands out when compared to other composite resins with a lower concentration of filler particles.<sup>8</sup> Its wear resistance is similar to well-known amalgam, according to Lazaridou et al,<sup>9</sup> which is a trait we want for the material that will be used as its substitute. Therefore, it is an excellent choice for challenging clinical situations where strength is essential for the longevity of the restoration.

An alternative to the indirect composite technique, which

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**The use of a high filler content composite is an ideal choice for the restoration of large cavities of posterior teeth.**

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age, mechanical properties suitable for use in posterior teeth, wear resistance, ease of polishing, and a wide variety of shades and opacities. These attributes make it much easier to carry out restorative procedures in a daily clinical workflow.

Among the different clinical situations, the one that demands the most from restorative materials is the restoration of posterior teeth with significant coronal destruction. This clinical situation can be a consequence of a broad range of factors, with fracture,



**Figure 1.** Maxillary right first molar presenting an almost total absence of crown structure.



**Figure 2.** Occlusal view.



**Figure 3.** Die Silicone (VOCO) cartridge.



**Figure 5.** Buccal view of the restoration before polishing.



**Figure 6.** Occlusal view, showing details of the sculpture.



**Figure 7.** After polishing, note the smoothness of the surface obtained.



**Figure 8.** A view from another angle.



**Figure 9.** The restoration after being separated from the model.



**Figure 10.** On the inner surface, we used a 15C surgical blade to remove silicone fragments.



**Figure 11.** After sandblasting the surface with aluminum oxide, we applied the adhesive.



**Figure 12.** Note that all surfaces were covered with the adhesive.



**Figure 13.** The tooth isolated with the rubber dam.



**Figure 14.** The shiny surface of the tooth after the application of Futurabond DC (VOCO) adhesive.



**Figure 15.** The entire internal surface of the restoration was covered with Bifix QM (VOCO).



**Figure 16.** The restoration was placed on the tooth.



**Figure 17.** We light cured through the restoration.



**Figure 18.** Just after cementation.



**Figure 19.** A buccal view one week later.



**Figure 4.** GrandioSO (VOCO) syringe.

requires 2 appointments and the use of a provisional restoration, is the semi-direct composite technique, which allows the treatment to be performed in a single appointment.<sup>10</sup> Both techniques are practically the same except that the semi-direct technique uses silicone instead of plaster to make the model. An alginate impression is taken of the preparation, and then Die Silicone (VOCO) is “poured” into the impression using a dental silicone impression cartridge dispenser gun (Dispenser Type 2 [VOCO]) 1:1 with a mixing tip. The model is completed in less than 5 minutes, and the preparation of the restoration begins. Die Silicone is an addition-curing silicone for the fabrication of dental models.

This clinical report presents a 6-year followup of a semi-direct restoration fabricated with GrandioSO.

#### CASE REPORT

A 62-year-old female patient sought care due to the loss of a restoration of the maxillary right first molar after “biting very hard food.” Upon clinical examination, it was observed that most of the structure of the clinical crown was absent (Figures 1 and 2). The tooth presented pulp vitality and normal sensitivity despite the fracture. We chose to use

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Figure 20. Another view.



Figure 21. An occlusal view one week after the conclusion of the case.



Figure 22. An occlusal view 6 years later.

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a semi-direct technique. This technique creates a situation where it is unnecessary to spend time making a temporary restoration and, therefore, could be completed in just one appointment. The semi-direct technique consists of preparing the tooth, taking the impression, fabricating the restoration on a model, and luting it in a single appointment. To facilitate this procedure, it is necessary to obtain the working model quickly, or else this tech-

nique would be impractical. Among the materials used to fabricate models, as stated above, silicone is a great option. It has a short polymerization time, and removal of the restoration

taken using alginate. We used Silicone Die (Figure 3) to fabricate the model. GrandioSO composite resin (Figure 4) was chosen to fabricate the restoration due to its high filler content

## The semi-direct technique makes it easier to perform the sculpting of the restoration....

from the model is very easy.

After cleaning the tooth surface with pumice, an impression was

and better mechanical properties<sup>7</sup> while also being quite adequate for restoring large cavities. Two shades (A4 and A1) were used to build up the onlay restoration (Figures 5 and 6). After initial finishing and polishing (Figures 7 to 9), we scraped the inner surface to remove silicone fragments using a #15C surgical blade (Figure 10). It was then sandblasted with aluminum oxide (50 µm), and the adhesive was applied (Figures 11 and 12). After performing the occlusal adjustments, the tooth was isolated using a rubber dam (Figure 13). The Bifix QM (VOCO) resin-based adhesive cement system was used for the cementation. The adhesive was applied to the tooth surface (Figure 14). The internal surface of the restoration was completely covered with Bifix QM (Figure 15) and then seated on the tooth (Figure 16). After removing the excess cement, it was light-cured (Figures 17 and 18), the rubber dam was removed, and all surfaces were cleaned and checked for the final result (Figures 19 to 21). After 6 years, the patient returned, and upon clinical examination, we found that the restoration had remained in good condition, with minimal wear, maintaining its functional shape, and with only a slight loss of surface gloss (Figure 22).

### CONCLUSION

In summary, the use of a high filler content composite is an ideal choice

for the restoration of large cavities of posterior teeth. The semi-direct technique makes it easier to perform the sculpting of the restoration and often allows for greater application of a minimally invasive preparation. ♦

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