



An Effective Technique to Posterior Resin Composite Restorations

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ABSTRACT

Aim: The aim of this study is to present a clinical case in which an occlusal matrix device was used in a patient who needed to restore a posterior tooth.

Material and methods: A direct duplicate occlusal appliance was used (biteperf) in a patient who needed an occlusal restoration in two posterior teeth.

Results: Using the matrix helps having fast and accurate reproduction of the original anatomical details of the occlusal surface. The final result surprised with the presented restoration in terms of esthetic quality, despite the simplicity of the technique.

Conclusion: Posterior teeth with initial lesions were confined to the occlusal surface of anatomically complex or fissured anatomy with or without signs of proximal caries which are ideal candidates for this technique. The overlying enamel surface must be relatively intact; lesions of hidden or occult caries.

Clinical significance: The aesthetic and time-saving benefits of the occlusal device (biteperf) are immediately clear. The matrix allows the fast and accurate reproduction of the anatomic details of the original occlusal surface of the tooth. The professionals who lack an artistic penchant and marked manual ability will be able to carry out excellent posterior resin composite restorations.

Key Words: Composite resins. Dental occlusion. Esthetics, Dental.

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INTRODUCTION

The composite resin fillings for posterior teeth have been widely used on dentistry practice due to its better esthetics and more dental preserving cavities. In fact, besides the great reliability of amalgam properties, there was an absence of potential alternatives to substitute it, which made it lasts

for a long-time. However, in 1975s the resin composites were introduced to European market being a controversial subject because since it came to United States, some reports stated that its physical properties limited its use. Several studies were done to resin materials today be accepted as safe restorative materials.^{6,14,17} The great dentist responsible for acceleration on research related to adhesive restorative materials was Buonocore,⁷ who, in 1955, presented the enamel acid-etch approach compounding the adhesive dentistry beginning. Latter, Bowen, 1963, presents resin composites as restorative materials.⁶

Despite the reduction in caries prevalence and need for direct restorations,⁹ hidden occlusal caries in a frequent finding in 14 to 20-year-old.²⁶ These caries may leave the occlusal surface unscathed. The occlusal morphology of bicuspid and molars, participates actively in the chewing process and it is important to those aspects related to occlusion.¹¹

Restoring posterior teeth with composites is a technique-sensitive task.¹ Finishing and polishing procedures potentially risk damage to sound tooth structure, under-contour or overcontour over the restoration and marring the restorative margins.¹⁵

DESCRIPTION OF TECHNIQUE

Mandarino et al¹⁹ (1989) describing the occlusal matrix of Barricaid, reported laboratorial tests proving the halogen light passage efficiently curing composite resin of nearly 2 mm in thickness since the exposure time is raised to 120 seconds as in the works by Jacobsen¹⁴ (1986) and Kanca¹⁷ (1985).

Baratieri et al⁴ (1996) described a new technique to composite resin restorations on posterior teeth. A clear acrylic resin matrix, fabricated prior to the preparation of occlusal and proximal surfaces, is employed. The matrix allows the fast and accurate reproduction of the anatomical

details from the original occlusal surface of the tooth. Liebenberg¹⁸ (1996) related that if correctly employed, it will optimize the quality and success of posterior tooth-colored restoratives and provide superior clinical service.

Hamilton et al¹² (1998) and Margaret²⁰ (2008) evaluated the custom occlusal matrix technique for posterior light-cured composites and related that clear custom occlusal matrices reduce placement and finishing time and improve surface smoothness when compared with a standard technique.

Posterior teeth with initial lesions confined to the occlusal surface of anatomically complex or fissured anatomy with or without signs of proximal caries are ideal candidates for this technique. The overlying enamel surface must be relatively intact lesions of hidden or occult caries.^{27,28}

Biteperf[®] company (Dental Products – Spain), commercializes a direct occlusal duplicating device (Biteperf) (Fig. 1) that fits perfectly to this purpose. The product, present in a regular kit, contains 40 duplicating devices with ideal shape.⁸

Occlusal relationships are checked and adjusted if necessary, before anesthesia is administered (Fig. 2). The working field is isolated with rubber dam.

The Biteperf impression material is heated by holding it by the alcohol torch for 10 seconds or until it achieves a shiny surface (Fig. 3). The device must not come in contact with the flame at any time. Once softened, it is ready for use.

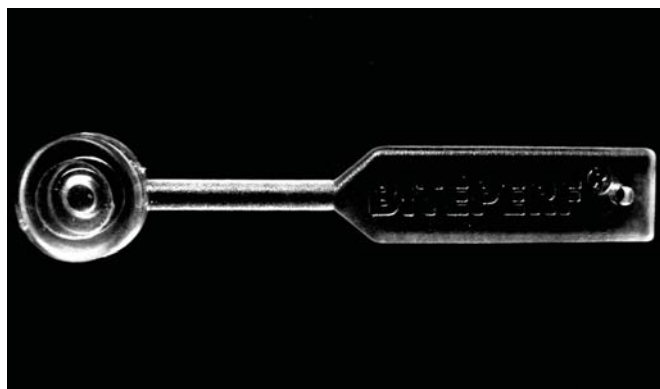


Fig. 1: Selection of case



Fig. 2: Device (Biteperf)

Apply the impression material with pressure over the moist occlusal surface and cool by water spraying it for 20 seconds (Fig. 4). Remove the device and store until needed, away from direct sunlight and heat producing apparatus. At this moment, it can be seen if the device is correctly adapted (Fig. 5).

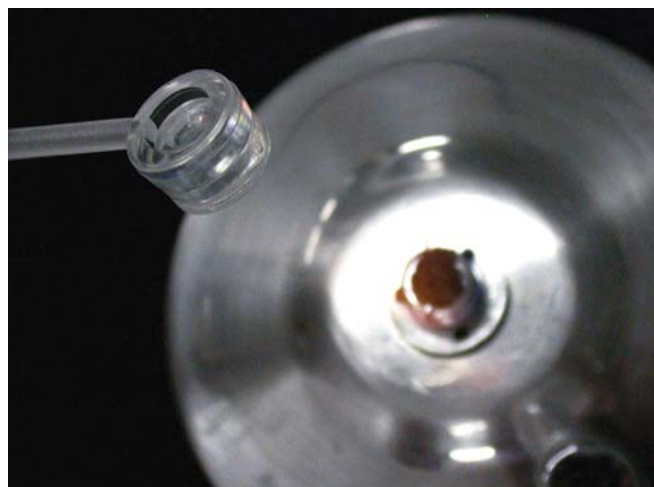


Fig. 3: The Biteperf impression material heated by holding it by the alcohol torch

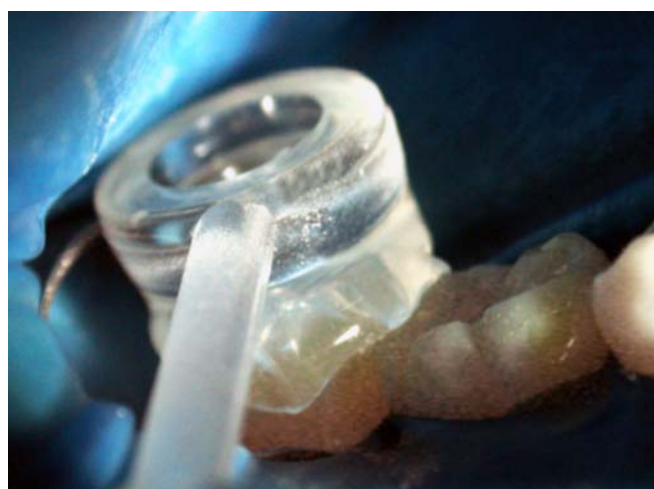


Fig. 4: Apply the impression material



Fig. 5: Device after impression

Cavity preparation is completed within the parameters of recent conservative guidelines. In essence, cavity design, outline and preparation, are dictated by the existing caries involvement. The dentinal and enamel surface are then treated according to the protocol of the chosen adhesive agent. Place composite by incremental technique. Leave approximately 2 mm for the last layer, insert composite resin and not light cure (Fig. 6).

Place the impression index over this last layer, visually check if it is fit, press firmly against the tooth's occlusal surface and have the assistant place the light tip on the head of biteperf and light cure for 20 seconds. Light tips will fit on the free side of the device (Fig. 7). Buccal and lingual light curing may also be used. This step is essential, because it has been shown that the intensity of light is reduced by distance and inadequate polymerization decreases the physical properties of composite resin.²⁵

Remove the device and continue to light cure according to manufacturer's instructions. The restoration is now checked for interfering occlusal contacts. Sometimes minimal adjustments and polishing are needed (Fig. 8).

When necessary, the Jiffy brush (Ultradent) is much appropriated for this step (Fig. 9).

Shaping a filling is understood as the final contour given to it. During shaping, these devices leave microscopical defects on restoration surface, thus, it can be emphasized as a great advantage of using preimpresed matrix to those reconstructions, as it significantly decreases the amount of shaping needed to reestablish the dental contour.

Indications

Occlusal matrix can be used in those cases with underlying caries with a sound occlusal surface. The matrix is more suitably indicated for class I and class II restorations, both incipient and large, where sound enamel is present on the occlusal region and marginal ridges and the carious lesion extends to dentin from the dentinoenamel junction.

DISCUSSION

The esthetic and time-saving benefits of the occlusal device (biteperf) are immediately evident. The matrix allows the



Fig. 6: Last layer of composite resin inserted and not light cured

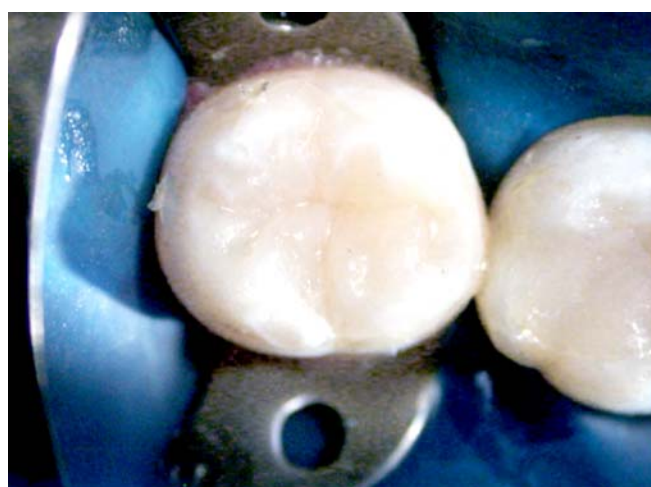


Fig. 8: Visualization after removal of device



Fig. 7: Light tips fit on the free side of the device



Fig. 9: Case finalized

fast and accurate reproduction of the anatomic details from the original occlusal surface of the tooth.⁸ The professionals lacking an artistic penchant and marked manual ability, would be able to carry out excellent posterior resin composite restorations.

Mandarino et al¹⁹ (1989) and Baratieri et al⁴ reported the occlusal matrix use, empathizing the advantages of its use including less chairside work time, anatomical reconstruction loyalty and ease of use.

This matrix is used with a preimpression previously to cavity preparing, when all dental elements are decayed but the occlusal shape is not changed. This matrix is usually obtained with colorless photo or autocured materials previously lubricated with a water-based lubricant in case of autopolymerizing, acrylic resin is used to impression.

Other great advantages of using this matrix are occlusal surface reliable reproduction with more acceptable esthetics; cuspsids, enamel bridge, versant and other anatomical structures recovery at the places it used to be, thus decreasing the need for major occlusal adjustment to better contacts points distribution; risk of occlusal prematurities in the restoration is substantially reduced; it is easily done technique; low costs and less operative time.²⁴

However, the time of polymerization indicated after device removal, should be respected. The composite resin polymerization reaction activated by halogen light begins and maintained during the whole activation process when a sufficient light intensity is irradiated to its surface keeping the photosensitive component (camphoroquinone) on a triple or excited state.

Resin composite's proper polymerization is a paramount factor to obtain optimal physical properties and clinical performance of the fillings constructed with those types of restorative materials.^{2,5} Some problems can be associated to inappropriate curing as follows: Reduced physical properties,^{2,5,29} oral environment solubility²² and even pulp irritation.¹⁷ The light-cured esthetic fillings success depends on factors, such as emission of sufficient light intensity, proper wavelength and exposure time.³

The composite resin curing is directly related to some restorative material peculiarities and also of the photo-activation light source as follows: Charge particle's size and shape,²⁹ photoactivation techniques²² among other factors. A hard and polished surface presence does not necessarily indicate a good result. Incomplete polymerization results on deformities that can lead to several composite resin changes.^{19,23}

The quality of placement and finishing of posterior composite resin has significant effects on the success of the procedure. Finishing errors include overfinishing, underfinishing, deep occlusal anatomy and pulverized

margins.¹⁵ The major advantage of this technique, therefore, extrapolated from studies of the effects of finishing on composite resins,¹⁵ is an improvement in the overall quality of the direct tooth-colored restoration.

Another advantage may be a reduction in porosity, which is a major concern in resin composite restorations. Porosity has been associated with a significant decrease in fatigue strength.¹⁰ It may be impossible to avoid operator-induced porosity when the final occlusal form is manipulated during placement, as has been shown in scanning electron microscopy studies.¹³ It seems logical, therefore, that optimal results require minimal handling during placement. In addition, a marked reduction in porosity can be achieved by the application of pressure to resin composite for a short time after placement,¹⁶ as facilitated by this technique. Furthermore, it is anticipated as the superficial hardness will be improved because the occlusal device isolates the resin composite from oxygen in air and it has been shown that oxygen disturbs polymerization by termination of reaction.²¹

Following steps, indicated for manufacturer's occlusal matrix, can be safely used and when it is well-indicated, promote highly satisfactory results.

CONCLUSION

The use of device is described in this present article. This tool requires a macroscopically intact occlusal surface prior to restoring the tooth to be able to register the occlusal print. The correct manipulation of this method easily and quickly renders a restoration matches the preoperative occlusal feature. Use of this device provides optimal esthetics and function without altering the patient's occlusion.

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