



Midline Diastema Closure in a Single Visit: Case Repot

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Abstract

Diastema, which refers to the space between two teeth, can occur for a variety of reasons and is common in the front part of the upper jaw. Diastemas with several causes, such as size anomalies, congenital tooth loss, atypical swallowing, and hypertrophy of the labial frenulum, can be treated with minimally invasive techniques. Direct prepless composite resin restorations can be economical and successful after the treatment of abnormal frenum. In this case report, a one-shade restorative material is used to restore diastema in the anterior region in a single visit. The success of the final restorations were assessed in 3 month, 9 month and 18 month follow ups.

Keywords: Aesthetic Dentistry; Midline Diastema; Prepless Restoration

Introduction

The word esthetics derives from the Greek "aisthetikos," which means perceiving or noting. Esthetics is the branch of philosophy concerned with the nature and appreciation of beauty. In contemporary philosophy, there is a first concept that beauty can be objective and universal. However, there is also a second concept that involves the viewer's interpretation of beauty, which is subjective and can vary according to class, culture, and education [1,2].

Then, reproducing a biomimetic match between restorative materials and natural teeth involves not only knowledge and manual ability but also psychology and even philosophy. Many aspects are involved to perfectly reproduce a natural tooth, such as proper form, anatomy, contour, color, gloss, texture, translucency, fluorescence, and opalescence [1]. This paper provides general introduction to these aspects and how they can affect esthetics. Also, clinical tips are provided to achieve seamless transition between natural tooth and composite restorations [1,2].

Diastema, which refers to the space between two teeth, can occur for a variety of reasons and is common in the front part of the upper jaw. Diastemas with several causes, such as size anomalies, congenital tooth loss, atypical swallowing, and hypertrophy of the labial frenulum, can be treated with minimally invasive techniques. The composite and indirect restorative materials can be used to treat dental caries with this cavity pattern [3,4].

Due to the importance of aesthetics in human life, the number of people seeking dental treatment has significantly increased. With this increase, minimal invasive treatment approaches, based on the premise of minimal tissue damage and maximum benefit, have become increasingly widespread [5]. In addition, the growth of cosmetic clinical treatments and the increase in patient expectations have led to the emergence of new dental materials [6].

Color selection is the first step before restoring a tooth. Different methods are described in literature to select color in dentistry [7]. The most traditionally used method is the visual analysis of color. This is a subjective simple method

in which a standardized shade guide is compared with the natural tooth [8].



Figure 1: A realistic digital design was presented to the patient to communicate a proposed additive option for closing the diastema and enhancing the shape of both central incisors. This image shows the proposed changes.

Resin composites are usually divided into four types: dentin; body, also called “universal”; enamel; and translucent. However, not all brands have all types of resin composites [9]. The basic difference among the different types of resin composites is the translucency. In general, dentin and body types are more opaque than enamel and translucent types. Thus, dentin and body types are used in deeper layers to substitute dentin, while enamel and translucent types are used in superficial layers to substitute enamel [1,2,10].

The translucency of the different types of resin composites follows the decreasing order: dentin (most opaque), body, enamel, and translucent [11].

The shades of dentin, body, and enamel types are available based on the VITA classical shade system. However, special shades for bleached teeth are also often available as white or extra white. The shades of the translucent type are usually clear, blue, gray, and amber, also called opalescent. However, not all brands have all shades of the translucent types [12].



Figure 2: Diagnostic wax-up, performed with gray wax and a white stone model following the approved digital design on the case presented in Figure 1 and Figure 2. This is a frontal view of the wax-up.

Function, form and esthetic are adequately restored in direct procedures with composite resins, with the restorative conception in close relation to conservative operative interventions. In this case report, a one-shade restorative material is used to restore diastema in the anterior region in a single visit.

Case Report

A 34-year-old male patient with cosmetic issues in the anterior region sought treatment at the restorative dental clinic (Figure 1). According to the anamnesis, there was no evidence of a systemic illness. The intraoral and radiographic examination revealed diastema in the anterior region on teeth #12, #21, (Figure 1). The patient was informed of alternative treatments. In accordance with the patient's approval, it was determined that direct composite restorations would be applied in a single visit because it was the least invasive, quick, and cost-effective. The button technique was utilized to determine the color, and the restorative material selected. Following color-matching, rubber-dam was applied, and the processes of preparing cavities and beveling were completed (Figure 2). After applying 37% orthophosphoric acid on the enamel surfaces, washing and drying procedures were carried out.



Figure 3: Besides providing an extremely clean working environment, floss ligations can significantly improve access. This image was taken before floss ligation.

Two-step self-etch adhesive Bond was applied according to the manufacturer's instructions. Nanofil-based composite was utilized as a restorative material. The polymerization procedure was performed using a high-performance LED light unit. When treating diastemas using a specialized anterior matrix system, the gingival emergence profile was restored to its anatomical state. In the final step of layering, glycerine gel was used prior to polymerization to prevent the formation of an oxygen inhibition layer (Figures 3 & 4).



Figure 4: Besides providing an extremely clean working environment, floss ligations can significantly improve access. A double floss ligation was performed on teeth Nos. 8 and 9.

Polishing discs and spiral polishing materials with two different grain structure were used in combination for finishing and polishing (Figure 5). For the approximate

areas, the interdental strips of varying grain sizes were used from coarsest to finest. The image was captured immediately following the polishing process (Figure 6).



Figure 5: To ensure protection of the adjacent teeth during air-abrasion, a clear mylar band was utilized.



Figure 6: Similarly, during the etching process and bonding, Teflon sheets were employed to safeguard the neighboring teeth.

1 month later, an oral and radiological assessment of the patient was undertaken. According to United States Public Health Service (USPHS) guidelines, the restorations were measured. All restored teeth were assessed as "Alpha" for

restoration, marginal integrity, anatomical form, secondary caries, surface texture, shade match, marginal discoloration and postoperative sensitivity (Figure 7).

Discussion

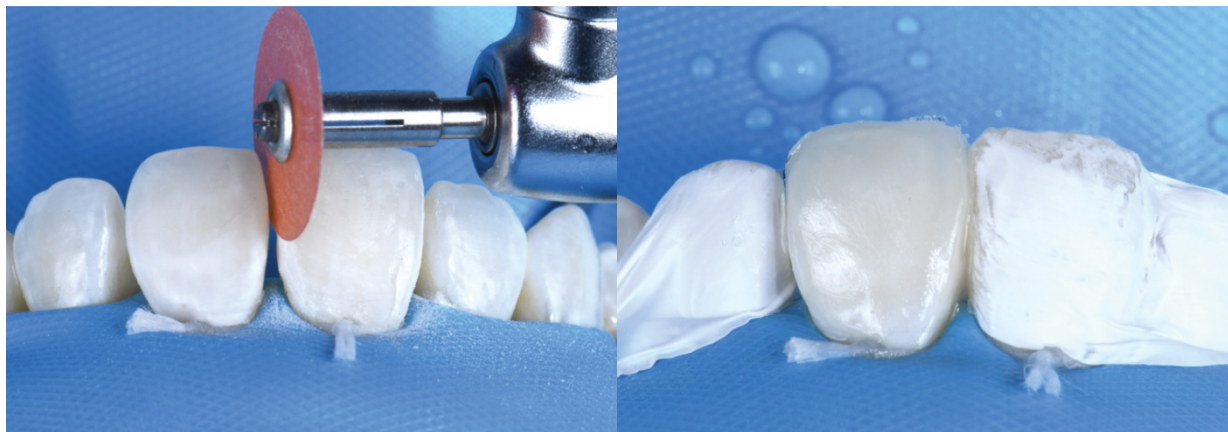


Figure 7: As performed during the wet-mockup, the clinician initially applied the chosen palatal layer to create the initial shell, followed by the selected enamel shade on top to complete the restorations. Clinicians must bear in mind, however, that colors and translucencies may be misrepresented under rubber dam isolation due to dehydration. Clinicians must bear in mind, however, that colors and translucencies may be misrepresented under rubber dam isolation due to dehydration.

Shade selection should be one of the initial steps during the bonding appointment, as tooth rehydration can significantly affect the choice of composite shades. Once the target shade is chosen, a combination of different shades should be selected for what is referred to as a "wet mock-up." The wet mock-up involves quickly stacking the chosen layers using prefabricated putties based on the wax-up, with the intended thickness in mind. One might think of this as a fast composite restoration with no isolation [12]. This step should be

performed without etching or the use of any bonding agent [1-3]. It has been suggested that the wet mock-up be allowed to stay in the mouth for full hydration to take place. A complementary step clinicians can take to confirm their choices of layers is to take a cross-polarized photograph with the mock-up on the tooth [1,13]. Handheld polarized flashlights can also be helpful when evaluating the selection of shades. Such mock-ups are encouraged to be repeated until the desired shade is achieved [14,15] (Figure 8).



Figure 8: The final results of the case presented were achieved during a second follow-up appointment. At this stage, minimal texture was added using a round diamond bur; the shape of the restorations was finalized, and everything was polished using rubber wheel composite polishers.

Material selection is extremely important when direct composite is used in the anterior region. Resin composite systems for anterior restorations should have a wide range of shade selection options to achieve precise color matching with the patient's natural teeth. The author uses G-ænial A'CHORD (GC America, gc.dental/america), which is an ideal composite for anterior cases because of its simplified unishade system that enables the attainment of up to 16 classic VITA shades (VITA, vitanorthamerica.com) effortlessly with only five core shades [1,2,11,12].

Composite resins should exhibit excellent handling characteristics to facilitate easy manipulation and sculpting to achieve the desired shape and contour of the restoration. Often, meticulously reshaping the composite into smaller, round increments, while wearing clean and uncontaminated gloves, or using instruments in conjunction with modeling resin can markedly enhance both the material's viscosity and ease of handling [16,17](Figure 8).

A key aspect of dental treatments involving anterior teeth is their shape. The shape of teeth, especially anterior ones, holds considerable influence on how they are perceived. If the tooth's shape is correctly formed, adhering to characteristics that mimic natural tooth structure, discrepancies in shade become more forgiving. While the matrices, created based on the diagnostic wax-up, offer essential guidance in completing anterior restorations, having a profound knowledge of shape helps steer the final finishing steps-the most critical aspect [1-3,18-20] (Figure 2).

Chairside dental photography is necessary during these finishing steps, as different flash set-ups provide various representations of the teeth. With the right dental photography set-up, clinicians can better assess the shape of their restorations. The finishing protocol involves a back-and-forth cycle of photographs and the use of a combination of fine diamond burs, finishing and polishing discs, and composite polishers to improve the shape of the restorations. What is used to shape and polish is not so critical; any tools that allow the clinician to reshape restorations toward the desired final result should be utilized [1,2]. The keys are having a system to evaluate shape and understanding what needs to be changed to resemble as close as possible the diagnostic wax-up [21,22].

It should be noted that the final finishing and polishing do not have to occur during the same appointment. Practitioners may achieve better results by finishing the final shape and performing the final polish at another appointment when they can take a fresh look at the case (Figures 1 & 8) [1,3,7].

For this reason, it is highly recommended to present anterior bonding treatment to patients as a two-part treatment [1].

Maximizing the longevity of direct anterior composites extends beyond merely following the steps outlined in this article. Several crucial factors should be taken into account when selecting cases for anterior composite restorations. Initiation of case selection should involve a meticulous evaluation of the patient's bite. In direct anterior cases, particularly when teeth are lengthened, there is risk of incisal fractures if optimal guidances are not established [1,3].

Patient education plays a pivotal role in the success of such restorations. Thorough explanations should be provided to the patient regarding post-treatment considerations associated with direct restorations. [20]. The need for maintenance and re-polishing should be discussed. Additionally, patients should be informed about the importance of asking their hygienist to avoid using abrasive polishing paste during cleaning sessions. Finally, individuals with a history of grinding and clenching should consider using nightguards after receiving their restorations [1,2,18,20].

All the effort invested in anterior direct restorations, from both the patient and operator perspectives, culminates in the value that additive density provides. The impetus behind putting in this effort in daily practice should stem primarily from the clinician's profound appreciation for nature, which is simply irreplaceable [21,22].

The case was resolved in a single session with minimal wear of tooth structure, reproducing the excellent contour. The diastema was closed using the composite material as it was the most conservative option available and also the patient was not ready for an expensive treatment. However, after polishing and finishing, the discoloration remained but did not become an esthetic failure due to a low lip line [1,3]. Lastly, the composite finishing and polishing protocol enabled a highly polished surface and resulted in a satisfied patient [23].

Conclusion

Composite resin is a popular material class for the production of aesthetic anterior restorations due to their straightforward use and rapid application, good repair options and high aesthetic potential when used properly. The case example illustrates that a treatment with composite resin is often the best treatment option when a non-invasive procedure completed within a single visit is desired.

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- **Conflicts of interest**

There are no conflicts of interest.

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