



## Aesthetic Rehabilitation with Nano Composite Material-Case Reports

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### Abstract

Aesthetic or cosmetic dentistry is one of the main areas of dental practice. Increasing demands of patients for aesthetics has resulted in the development of several techniques for restoring the anterior teeth. Composite resin restorations have become an integral part of contemporary restorative dentistry and can be called "star of minimal invasion" due to its conservative concepts. The direct composite veneering allows restoring the tooth in a natural way and preservation of sound tooth structure when compared to indirect restorations. In this article, we will describe, through clinical cases, the closure of diastema inter incisor by direct composite resin.

**Keywords:** Midline Diastema; Esthetic; Spacing; Composite Restoration

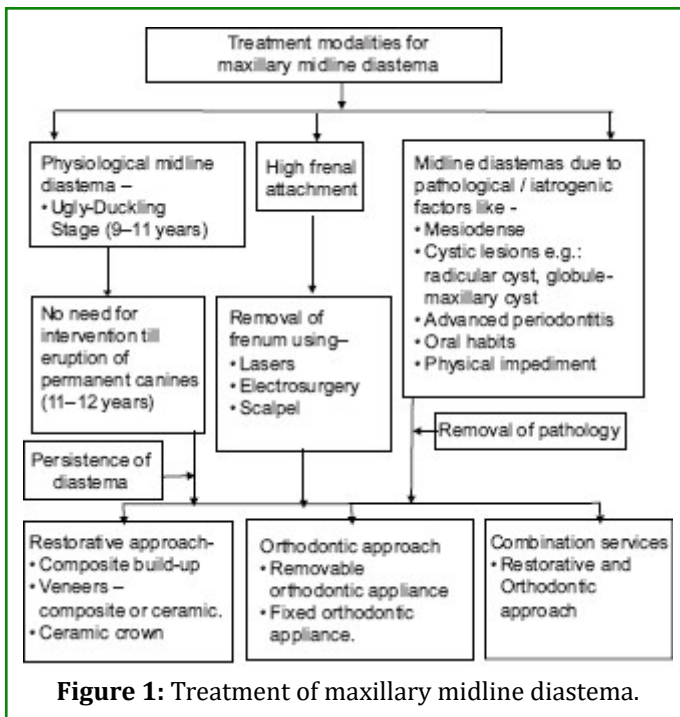
### Introduction

In restorative dentistry, esthetics is defined as the art of creating, reproducing, copying, and harmonizing restorations with contiguous dental and anatomical structure [1]. Cosmetic dentistry can be defined as the set of operative procedures and the application of dental materials that aim to restore esthetic beauty and harmony.1 Cosmetic recontouring is considered to be conservative, economical, and capable of providing benefits not only for esthetics and hygiene, but also for the optimization of occlusal function [2].

A diastema is defined as a space greater than 0.5mm between the proximal surfaces of adjacent teeth. Angle, et al. described the dental midline diastema as rather common form of incomplete occlusion characterized by a space between the maxillary and less frequent- mandibular central incisor. The space can be a normal physiologic characteristic during the

primary and mixed dentition and generally is closed by the time the maxillary canines erupt [1-3]. For most children, the medial erupting path of the maxillary lateral incisors and maxillary canines, as described by Broadbent, results in normal closure of this space [3,4]. For some individuals, however, the diastema dose not closed spontaneously (Figures 1-8).

Numerous studies have investigated the frequency/prevalence of diastema. Consequently, there was a wide range of findings from 1.6% to 25.4% in adults and an even greater range in groups of young people [5,6]. Differences in epidemiological study findings may be attributed to the increased number of factors contributing to midline diastema, to the definitions used to explain its presence and to gender and race differences in the distribution of the hereditary feature in question [7,8].

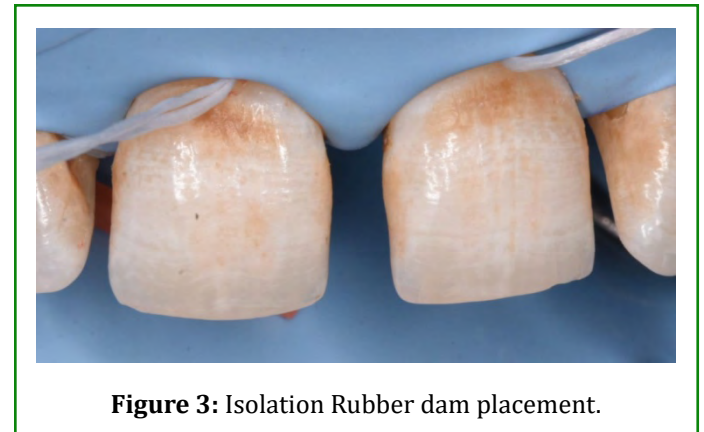


When a multidisciplinary treatment procedure is planned between the orthodontist and restorative dentist regarding the closure of diastema, then collaboration should begin at the diagnostic phase for the correct treatment procedure and successful outcome of the case [7-9]. Not in all the diastema cases but in some of them that gingival tissue can be found in asymmetric and creation of a pleasant restoration, and also natural smile cannot be overemphasized during closure of diastema [10]. Creation of an esthetically pleasant final restoration that is in harmony with the gingival structure can be accomplished by the periodontal surgery. When a disproportionate tooth form is identified and this is due to the gingival soft tissue, clinician should need to alter gingival soft tissue first by periodontal surgery (i.e., gingivectomy or gingival grafting) before initiation of any definitive restoration [10]. Leveling of gingival structures can be also accomplished by the orthodontic intrusion or extrusion treatments [10].

When planning diastema closure, esthetic considerations, smile design, and multidisciplinary comprehensive approach should be considered for a successful restorative treatment. Achieving an esthetically pleasant and functional final outcome that is in good relationship with the temporomandibular joints, muscles, face, lips, gingival structures, teeth, and occlusion is an important factor for the multidisciplinary treatment options [11]. Diastema closure especially for the excessive spaces present challenging treatment procedure, and therefore, a comprehensive treatment planning along with the study models, photographs, occlusion analysis, soft and hard tissue, as well as facial analysis should be correctly and collaboratively planned. During the diastema closure, the clinician should always measure the tooth proportions and should create as proper tooth proportions as to ideal form for an esthetically pleasant and natural final outcome [12,13].

In this article, we will describe, through clinical cases, the closure of diastema inter incisor by direct composite resin.

### Clinical Case



25-year-old male referred to our clinic because of spacing between his maxillary central incisors and he was unhappy with his smile. The clinical examination revealed maxillary midline diastema (approximately 2-mm width) with excellent oral hygiene and incisal wear on his mandibular incisors. Occlusal examination also revealed no pathology or interferences that would contraindicate diastema closure with direct resin composite between maxillary central incisors. After discussing the treatment options with the patient, he decided to have resin composite restorations for the closure of midline diastema. Before starting the diastema closure with direct resin composite buildup, patient lips and cheeks were retracted and the operation field was isolated with retraction cords. After placement of retraction cords, shade selection of the teeth was made using shade guide that was provided by the manufacturer. In this case, no enamel roughening procedure was used, and uncut mesial enamel

surfaces were acid-etched for 30 s with 32 % phosphoric acid gel, rinsed for 20 s, and air-dried. A multimode adhesive bonding agent was applied to the acid-etched surfaces, gently dried, and light-cured for 10 s. Then first proximal layer of resin composite in A2 enamel shade was placed on tooth #11 and light-cured. Thereafter, dentin replacement layer in A2 dentin shade and final enamel composite layer were placed and each layer light-cured. During this step, resin composite material was carefully manipulated and shaped using a brush. The same procedure was also followed on tooth #21 and restorations were finished. After completion of the restorations, retraction cords were removed and each restoration was then light-cured for 40 s from facial and palatal directions. During placement of the resin composite, care was taken to create the desired anatomical proximal contacts especially in the gingival region. Finishing and polishing of the restorations were primarily done with a fine diamond bur and then with sequentially used polishing discs and progressively finer-grit finishing strips. The postoperative appearance of the diastema closure with direct resin composite buildup. Patient was happy with the final outcome.



**Figure 4:** Etch the tooth.

## Discussion



**Figure 5:** Both palatal shell and proximal wall were built up.

The closure of diastema in the restorative treatment procedures is often successfully accomplished with resin composite materials and porcelain laminate veneers [2-6]. Emerging technologies, improvements in the resin composite formulations, and adhesive materials have made it possible to restore teeth same as natural, biomimetic, and functional by creating a strong bond between tooth structures with minimal invasive or no tooth preparation by preserving the healthy tooth [7]. Significant development in the material formulation in recent years has led to the development of new monomers, fine filler size for resin composite materials with reduced polymerization shrinkage, high mechanical and physical properties, and high polishability and also mimics nearly the same as the natural tooth structures [8-10].



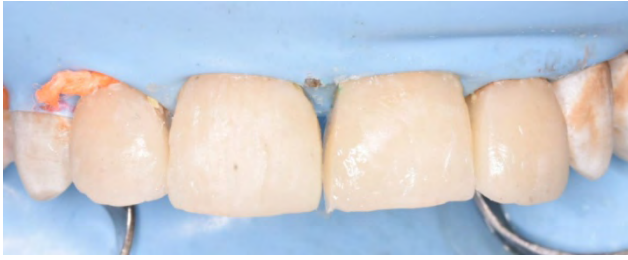
**Figure 6:** A1 shade composite resin was used as dentin layer and a thin layer of JE shade was used as the top enamel layer. Labial surfaces of the restorations were flattened by using a red banded knife-edged diamond bur.

The creation of a natural appearing restoration that is nearly similar to that of the real tooth, the clinician should consider to use stratification technique which mimics the dentin, enamel color, as well as incisal characterization [7-19]. Selecting an appropriate shade for direct anterior restoration is another important factor, and sometimes it can be difficult [12,13].

Nanosized composite materials have led to increased filler loading and reduced resin matrix which allowed improvement of the physical and mechanical properties of the material with enhanced esthetic characteristics and reduced polymerization shrinkage [14-17]. Although, there have been continuing improvement in the resin composites, the use of polychromatic stratification technique is still necessary for the creation of esthetically pleasant final restoration especially in the anterior region [18,19].

The diastema presented in this reported case can be classified as small, as its size is between 0.5 and 2 mm and the restorative treatment was chosen [1,2,4].





**Figure 7:** Polishing discs were used for detailed polishing from rough to finegrit.

This restoration offers various advantages, it can be placed in a single visit and it does not involve laboratory fees that escalate costs [1-3]. The direct adhesive restorative procedures have the advantages of requiring the minimum weariness of tooth structure and showing a good clinical durability [1,2,20]. Composite resin is an ideal material when restoring the anterior diastema closure. It is highly polishable, long lasting and mimics natural tooth structure. In this present study, we used nanoparticles composite [21]. The materials with this type of particles provide a smoother surface and therefore favor the outcome after polishing and brushing procedures [1,2,20,21].



**Figure 8:** The restoration at one-week recall shows the optimal blending between restoration and tooth structure.

Procedures which consist in imitating the shades and layering techniques developed for ceramic restorations are complicated and mastered only by highly skilled practitioners [4,22]. Thus, the appearance of the “natural layering concept” made it possible to simplify the procedure and led to achieve a highly aesthetic direct restoration. Since this concept has become a reference in the field of composite restorations, the aim of this paper is to familiarize the practitioner with the features and clinical aspects of this new technique [1,2].

The freehand laminating composite resin veneers is based on the “natural layering concept” which is more conservative in terms of dental tissue and is carried out in a single clinical session.

For our clinical case, the stratification is purely aesthetic: the palatal wall is functional, and therefore, the composite

is limited to the vestibular surface and possibly the anterior part of the free edge. For complex anterior composite restorations the clinician must have a comprehensive understanding of the colour, translucency and morphology of natural teeth as well as of the material sciences and the restorative techniques involved.

## Conclusion

With advances in material sciences, dentists can now, more artistically and predictably, mimic natural dentition and closure diastema that are not only fully functional, but also beautiful. When used correctly, composite resin provides fast, economical and aesthetic results. This method should be seen as a real alternative to the more invasive traditional restorations performed using porcelain crowns and veneers.

## Conflict of Interest

The authors have no conflicts of interest to declare.

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