

Aesthetic Closure Of Maxillary And Mandibular Anterior Spaces Using Direct Composite Resin Build-Ups: A Case Report

SUMMARY

The presence of multiple spaces in the anterior aesthetic zone can produce discomfort for patients and its treatment can be difficult for dental professionals. A variety of treatment options are available and these include orthodontic movement, prosthetic indirect restorations or direct composite resin build-ups. Among these, the closure of interdental spaces using composite build-ups combined with orthodontic treatment is considered to be most conservative. This type of treatment has several advantages like the maximum preservation of tooth substance (no tooth preparation), no need for anesthesia, no multiple time-consuming visits, no provisional restorations and also comparably low costs. Clinical Consideration: This case report describes the clinical restorative procedure of direct composite resin build-ups for the closure of multiple anterior spaces.

Key words: composite resin build-ups, multiple anterior spaces, aesthetic closure

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Introduction

Tooth size discrepancy or inappropriate distribution of space in the anterior region is a major esthetic issue for patients of all ages¹. The anterior spaces have a multifactorial etiology like microdontia, lateral incisor agenesis, habits like a finger sucking or tongue thrusting, lip sucking, dental-skeletal discrepancies and many more^{2,3}. As dental patients are becoming increasingly conscious about their appearance, they demand for aesthetic and minimal invasive high quality restorations⁴. With the improvement of adhesive and composite technology it became possible that direct composite build-ups are able to withstand great masticatory forces without suffering from fracture or loss⁵. Recent aesthetic composite resin materials provide great optical properties and offer a wide range of shades and varying opacities, translucencies and textures³.

However, the direct restoration technique may be difficult for the untrained dentist. Therefore, we present a case report showing the step-by-step fabrication technique of direct composite resin build-ups in the anterior dentition.

Case Report

A 35-year-old male patient visited the Department of Conservative Dentistry, Heidelberg University. He complained that large spaces between his maxillary and mandibular anterior teeth were present after orthodontic treatment (Figures 1a, 2, 4a, 5a). The patient's medical history did not reveal any systemic diseases. Intraoral clinical examination revealed irregular spaces between the maxillary central incisors, lateral incisors and canines on both sides, as well as between the mandibular lateral incisors and canines on both sides. The largest interdental spaces were approximately 2 mm in width. The general tooth shade of A2 (incisal) and A3 (body) was satisfying, however the maxillary right central incisor needed internal bleaching due to discoloration after root canal treatment.

Patient's periodontal health and occlusion were inspected, radiographs and intra- and extraoral photographs were taken. Diagnostic impressions, casts and a diagnostic wax-up were fabricated (Figure 7). The patient was found to be in good oral health (caries and restoration free) and no pathologies or interferences were found that would conflict with the treatment. The patient was

informed about the various treatment options (Veneers, crowns, composite resin build-ups). He preferred the most conservative approach favoring composite resin build-ups.



Figure 1a. Preoperative extraoral situation of patient with multiple spaces in anterior dentition.



Figure 1b. Postoperative extraoral situation of the patient after aesthetic closure of multiple anterior spaces with direct composite resin build-ups



Figure 2. Preoperative intraoral situation



Figure 3. Postoperative intraoral situation



Figure 4a. Preoperative intraoral situation



Figure 4b. Postoperative intraoral situation



Figure 5a. Preoperative intraoral view of the mandibular anterior spaces



Figure 5b. Postoperative intraoral view of the composite resin build-ups

After thorough dental consultation, the patient approved the treatment plan which included bleaching of the right maxillary central incisor and subsequent closure of the anterior spaces with direct composite resin build-ups.

The bleaching procedure followed an internal and external bleaching protocol, however it led to only minor brightening of the tooth color (Figure 6, 4a). Following, the composite resin build-ups were fabricated during one appointment. Initially, a palatal silicon mold made of putty material (Silaplast, Detax, Ettlingen, Germany) was created using the wax-up model (Figure 7). It is intended to assist when applying the first palatal layer of composite resin.



Figure 6. External bleaching of the left central maxillary incisor



Figure 7. Wax-up cast with silicon putty mold

Then, the tooth surfaces were cleaned with slurry of fine pumice. Enamel and dentin shades were determined to accurately match with the adjacent tooth structure. The patient's lips and cheeks were properly retracted (Opra Gate oral retractor, IvoclarVivadent, Schaan, Liechtenstein) and cotton rolls placed for the fluid control. The enamel was cleaned and roughened by airborne-particle abrasion with 27 μm aluminum oxide powder (Rondoflex, KaVo

Biberach, Riss, Germany). The uncut enamel was then etched for 30 sec. with 37% phosphoric acid, rinsed for 20 sec. with air/water spray and lightly air-dried. A filled ethanol-based adhesive system (Optibond FL, Kerr, Orange CA, USA) was applied to the etched enamel and light-polymerized for 20 sec. (Bluephase C8, IvoclarVivadent, Schaan, Liechtenstein) (Figure 8).



Figure 8. Application of etching gel multi-step bonding system. Fabrication of the first palatal enamel layer with the silicon mold

A methacrylate-based nano-hybrid composite (Tetric Evo Ceram, IvoclarVivadent, Schaan, Liechtenstein) was used for the composite build-ups. It provides good handling properties and shade matching. A first thin layer of palatal/lingual enamel (Tetric Evo Ceram A3) was carefully shaped with transparent material using the silicone mold as a guide (Figure 8). This layer was then light cured for 15 sec. In order to avoid

a translucent shine-through-effect, a small amount of opaque dentin shade (Tetric Evo Ceram A3,5) was added on the proximal and incisal part, leaving space for subsequent characterization in this area. Therefore, a more translucent shade (Tetric Evo Ceram BleachM) was added characterizing the incisal edge. A single layer of a slightly darker shade of enamel (Tetric Evo Ceram A3) was applied onto the cervical-labial and cervical-proximal surfaces, whereas a lighter shade of enamel (Tetric Evo Ceram A2) was applied onto the incisal-labial and incisal-proximal surfaces. Each restoration was then fully light-polymerized for 60 sec. from multiple directions. Excess material was cut and removed with the aid of a size 12 scalpel and interproximal finishing was done with finishing strips. Further finishing was carried out with red diamond burs (for example 8889.314.009 Komet Dental, Gebr. Brasseler GmbH & Co. KG, Lemgo, Germany) and abrasive discs (Soflex, 3M Dental Products, St. Paul, Minnesota, USA) in order to create a surface macro- and microtexture. Final polishing was accomplished with silicone-impregnated polishing devices (Brownie/Greenie Shofu, Kioto, Japan) (Figure 9, 10). At this stage the incisal adjustment was also performed.



Figure 9. Preliminary results after the finishing procedure with red diamond burs and abrasive discs



Figure 10. Final polishing with silicone-impregnated polishing device

Discussion

In clinical cases where aesthetic corrections of anterior teeth are indicated the conservative direct composite resin technique may be preferable. However, to achieve the best aesthetic results, often an interdisciplinary approach is required⁴. In the presented case, minor orthodontic tooth movements were necessary before the teeth were corrected restoratively.

For the achievement of good results with a high level of predictability of treatment outcome, several aspects should be considered. Importantly, adequate diagnosis and planning should precede any treatment. In the presented case the treatment alternatives were either to insert indirect veneers or crowns, or to fabricate direct composite resin build-ups. This patient wished for a noninvasive treatment which led to the mutual decision on direct composite resin build-ups. To account for the advantages of this approach one can specify that the restorations can be placed in a single visit, provisional restorations are not necessary, the treatment is not painful therefore no anesthesia is required, the restorations can be easily repaired in case of failure, discoloration, fracture or chipping⁷, and the composite resin material is not as hard as ceramics, therefore preserving the opposing teeth from un-physiological wear. The satisfactory aesthetical outcome is demonstrated by clinical studies and various case reports^{8,9}. There are also some disadvantages of direct composite resin build-ups which include that the material is prone to potential fracture when heavy parafunctional forces are present. Moreover, the surface texture, glaze and color stability are not as long-lasting as with glazed ceramics^{10,11}. Like in all direct restoration techniques the outcome of direct composite resin build-ups is mainly influenced by the quality of the fabrication process (layering, finishing and polishing) giving high responsibility to the dentist.

Conclusion

Aesthetic insufficiencies like gaps and spaces in the maxillary and mandibular anterior dentition can be successfully treated with direct composite resin build-ups. The technique is least invasive when compared with treatment alternatives; it is reversible, repairable, and free of pain and can be carried out in one treatment session. Furthermore, depending on the insurance system of the respective country it represents, to a varying degree, a cost-effective method with interesting economic benefits for the patient and the dentist.

In most cases, this conservative approach results in complete patient satisfaction and successful long-term outcome.

Note: The results of this paper were presented as a part of an invited lecture at the 21st BaSS Congress.

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