Original Research Paper

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Direct Restorative Approach To Support Orthodontic Treatment

Dental Science

KEYWORDS:

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ABSTRACT

Objective: Aesthetic direct restorative approach to build-up and diastema closure procedures of anterior teeth during or after orthodontic treatment.

Introduction

The spaces more than 0.5 mm between proximal surfaces of adjacent two teeth may be called diastema.[1] The presence of diastemas especially in the anterior region may cause esthetic problems for patients.[2] The reported incidence range of median diastema in adult dentition ranges from 5% to 20%.[3,4] These spaces may have various etiologic factors such as; peg shaped teeth, oral habits, transpositions of teeth, pathologies, deep overbite, genetic predispositions, abnormal frenulum attachments and tooth migrations.[5] Diastemas my also occur during or after orthodontic treatment. Talking about orthodontics, the etiology of these spaces may be divided into two groups: (1) those present before the beginning of orthodontic treatment and (2) those present either before the removal of the bands but after the teeth are moved to their desired antero-posterior and vertical relations. Even after orthodontic treatment the diastemas between incisors can remain causing an unwilling aesthetic outcome. If these spaces may not be closed with orthodontic treatment, then restorative build-up approach may produce acceptable aesthetic results.[3] However closing these unwilling spaces between anterior teeth without creating black triangles is a real difficult situation.[2] Ceramic laminate veneers or full crowns may also provide good and long-lasting results but they require extensive tooth preparation.[2,6] The proper treatment should be selected by function, aesthetics, the need for extractions, the position of the adjacent teeth and the potential for multidisciplinary restorative and orthodontic treatment. [4,7] Decisions such as the amount of distal proximal reduction, the number of teeth to be treated, the placement and location of prominences and concavities to create illusion effects and the decision for full-veneers or just adding to the interproximal are decided according to the width to length ratio of the incisors. [8,9] Recent developments in adhesive systems and composite resins allow clinicians to emulate the natural dental anatomy and shades of dentine and enamel layers with minimal invasive approach. Also by selecting proper indications and using the correct polishing materials and methods, stable and long-lasting asthetic restorations may be created in only one visit. [2,10-12]

Clinical Considerations

This article describes two cases of direct aesthetic composite build-up restorations on symmetrical incisors with insufficient width during orthodontic treatment. The orthodontic treatments in both cases were not able to be finished due to the incompatible data in Bolton Analysis. It was considered to complete the orthodontic treatments after correcting the disordered shapes of the teeth in consultation. The spaces that may not be closed due to the orthodontic limitations were corrected by using just aesthetic anterior composite resins, without any preparations and in one appointment. In both cases the width of the teeth were expanded by free-hand composite build-up technique by using selective-etching adhesive system and aesthetic anterior composite resins (Gaenial, GC, Japan).

Case 1

The patient illustrated was a 13-year-old male having undersized and tapered maxillary lateral incisors that is also called peg-shaped laterals[4]. He had been having orthodontic treatment for almost 1 year. Oral and periodontal conditions were determined as healthy in clinical and radiographic examinations. Building-up the maxillary lateral incisors with direct aesthetic resin restorations without preparation was considered as the treatment plan (Figure 1).

Figure 1: Initial

Shades selected by using the 'Button Technique'. Most appropriate dentin and enamel shades in anterior aesthetic composite resin set 'Gaenial (GC, Japan)' were selected and located on the crown of lateral incisors. The dentin shades were located on the mid-third and the enamel shades were located on the incisal-third of the crown. Then digital dental photographs were taken by using a professional camera set designed especially for macro dental photography. The set consists of a body (D700, Canon, Japan), a macro lens (Macro 100 mm L, Canon, Japan), a macro twin flash (MT-24EX Macro Twin Lite Flash, Canon, Japan), two side reflectors and a dual flash bracket mount (NovoFlex Uniset, Germany). The pictures were processed in a software program called Adobe Photoshop CC (Photoshop CC, Adobe Systems Software). A processed black and white form of the photograph was used to decide the enamel shade. Another processed copy on which contrast was increased and brightness was decreased, was used to decide the dentin shade. A1 as dentin shade and IE as enamel shade were selected for both of the cases. Retraction cords were applied gently to the teeth to be restored for moving gingiva 0.5-1.5mm apically so creating an open visual area without saliva leakage. The adjacent teeth were also covered with teflon tape for maximum isolation (Figure 2).

Figure 2: Isolation

One bottle universal adhesive (G-Premio Bond, GC, Japan) was used with selective etching. The half labial surface of the teeth were etched with 37% phosphoric acid (Gel Etchant, Kerr, USA) in order to create a good adhesion as well as aesthetic transition of the very top layer of the restorations. As a more chromatic and opaque resin, the dentin (A1) shade was applied palataly leaving 0.5-1 mm on the labial surface for enamel layering. After polymerization a more translucent

resin, the enamel (IE) shade was applied as the labial layer and polymerized. The layering was done by free-hand technique without using a silicone index or translucent strips for both of the cases. Final polymerization was done after application of glycerin (Air Barrier, GC, Japan) on the labial surfaces of the restorations to eliminate oxygen inhibition layer. The surfaces cleaned with water spray and dried with air spray (Figure 3).

Figure 3: Restoration before polishing

Marginal adaptations and removal of the excessive resins were done by a 12 lancet, a fine-grained composite polishing disc (Sof-Lex, 3M ESPE, Japan) and interface sandpapers (Epitex, GC, Japan) using from coarse to extra fine. The labial surfaces were polished by using only two rubber spiral composite discs with different grains (Twist-Dia, light blue and dark blue, Kuraray, Japan) in low speed and dry conditions (Figure 4).

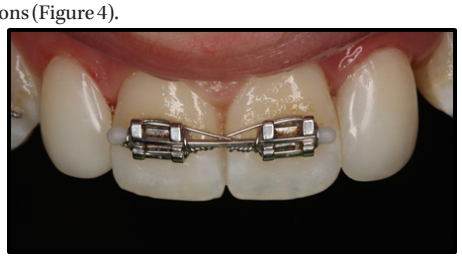

Figure 4: Final, just after the restorations

The patient was informed about the oral hygiene and also informed about necessity for corrections of the restorations after the completion of orthodontic treatment. The recalls were arranged for every 3 months (Figure 5).

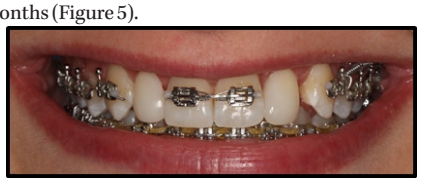

Figure 5: Final, just after the restorations

Case 2

The patient illustrated was a 14-year-old female having diastemas between maxillary central and lateral incisors. She had been having orthodontic treatment for almost 1 year. Oral and periodontal conditions were determined as healthy in clinical and radiographic examinations. Building-up the mesial margins of the maxillary lateral incisors with direct aesthetic resins without preparation was considered as the treatment plan (Figure 6-8).

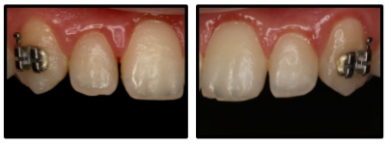

Figure 6-8: Initial

Shades selected by using the button technique as A1 and IE (Gaenial, GC, Japan). Retraction cords were applied gently to the lateral incisors and the adjacent central incisors were covered with teflon tape. One bottle universal adhesive used with selective etching. The dentin (A1) shade was applied palataly leaving 0.5-1 mm on the labial surface for enamel layering. The enamel (IE) shade was applied as the labial layer. Final polymerization was done after application of glycerin. Marginal adaptations were done by a lancet, a fine-grained composite polishing disc and interface sandpapers using from coarse to extra fine. The labial surfaces were polished by using rubber spiral composite discs in low speed and dry conditions. The patient was informed about the oral hygiene and also informed about necessity for corrections of the restorations after the completion of orthodontic treatment. The recalls were arranged for every 3 months (Figure 9-11).

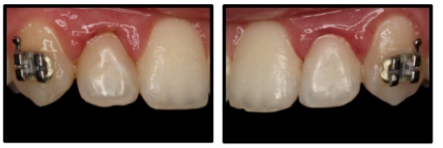

Figure 9-11: Final, just after the restorations

Discussion:

The presence of unwilling spaces between anterior teeth may lead to esthetic problems for the patients.[2] Even after orthodontic treatment the spaces may remain and need to be closed with one of the most non-destructive restoration methods in todays dental procedures, non-invasive direct composite resin build-up approach.[3, 6] These restorations are needed not only after the completion of orthodontic treatment but also during the treatment.[4,5,9] Orthodontists may need to see the teeth with correct width in order to create proper alignment of the teeth.[7,9] The direct composite resin restorations may be placed in a single visit as not requiring provisional models or wax-ups.[13]

In the case presented an anterior esthetic composite resin set, 'Gaenial (GC, Japan)' was used for the restorations that has nano-hybrid inorganic fillers. This resin was used with two-step layering technique by free-hand to mimic the natural dental tissue layers.

So that the additional restoration parts were able to emulate the optical properties of the natural dentin and enamel layers.[14-16] The stability of the restorations is granted by proper indication selection (the assessment of occlusal, lateral and protrusive relations), quality of the adhesive system (universal adhesive with selective etching) and resin (nano-hybrid esthetic composite resin) used and also the correct manipulation method (Free-hand layering).[14,17] The color stability of the restorations is granted by the elimination of the oxygen inhibition layer (Air barrier application) and detailed polishing of the whole restoration surfaces with quality materials (Sof-Lex, Twist Dia, Epitex).[16-18] These parameters are also under control with the periodical follow-up appointments.

Conclusions

The case reports demonstrated direct aesthetic build-up restorations in one appointment without any preparations. Considering that having such advantages as emulating natural dental outlook, being stable, functional, conservative and also repairable and saving chairtime; direct aesthetic resin restorations are one step ahead in need of supporting orthodontic treatment. Proper indication and manipulation technique, high quality materials and also clinical experience are the keys for highly aesthetic and stable results that can satisfy patients.

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