Digital Analysis and Treatment of Midline Diastema Closure: A Case Report

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Abstract

Objective: Presence of diastema between anterior teeth is often considered an orthodontic esthetic problem on the maxillary midline. Many treatment options are available for closing diastemata including orthodontics or restorative treatment. The success of restorative treatment in anterior teeth depends on the esthetic integration between soft and hard tissues. This case report describes the use of digital analysis for esthetic assessment and treatment of diastema closure using CAD/CAM crowns and composite resin restorations.

Materials and Methods: 41-year-old female patient with high smile line presented with esthetic concerns. Clinical exam revealed ill-fitting splinted crowns on teeth #8 and 9 that predisposed to localized stage III grade C periodontitis consistent with a vertical defect on the mesial of #8. Periodontal treatment consisted of localized scaling and root planing, frenectomy and periodontal regeneration. Once peridontal health was achieved, digital smile design was used to help the patient visualize the expected final result before starting the treatment and to serve as a guideline for the clinician to enhance the predictability of the treatment outcomes. A conservative approach with CAD/CAM crowns and facial composite restorations was indicated in this case in order to correct the malalignment and even the anterior teeth.

Results: Periodontal health and stability was obtained as it was fundamental before proceeding with the restorative work. Digital diagnosis facilitated the treatment with esthetic restorations and led to a harmonious smile and esthetic diastema closure.

Conclusions: The presence of a diastema between teeth is a common finding between the anterior teeth. Adequate case selection is of paramount importance for successful treatment. Proper diagnosis and treatment planning are mandatory to achieve predictable outcomes that meet patient’s needs without invading the bio-emuliation of the dentition.

Introduction

Modern dentistry is constantly searching for aesthetic excellence. New materials and techniques are often introduced, leading professionals to endless improvement while fulfilling their patients’ esthetic demands. In that context, one of the difficulties encountered is closing diastemata without creating ‘black triangles’ or wide gingival embrasures. Black triangles are spaces which appear between teeth when the gingival tissue does not follow the respective tooth contour and exposes the black background of the oral cavity. In this case report, we will discuss the periodontal and restorative treatment of a patient that presented with localized periodontitis and had esthetic concerns. The patient presented to the ECU SoDM Faculty Practice Clinic seeking treatment for her maxillary anterior teeth. Her chief complaint was to restore her dental health and improve her esthetic appearance. She previously had treatment to close her diastema however, she was not pleased with the esthetic result and furthermore she developed localized periodontitis. The purpose of this paper is to describe a case report in which periodontal regeneration was completed, and diastema closure was accomplished using direct adhesive restorations and gingival tissue recontouring.

Case History

A 41-year-old Hispanic female presented to ECU SoDM seeking treatment for her maxillary anterior teeth. Clinical exam revealed ill-fitting splinted crowns on teeth #8 and 9 that were placed by a previous dentist in order to close her diastema (Figure 1). Due to the restoration design, she was not able to perform proper oral hygiene and she developed localized stage III grade C periodontitis consistent with a vertical defect on the mesial of #8 (Figure 2).

Periodontal treatment consisted of localized scaling and root planing. Evaluation of initial therapy was completed 8 weeks after (Figure 3). Inflammation was decreased however due to the deep probing depths of #8 on the mesial aspect of #8 and configuration of the defect, periodontal regeneration was indicated (Figure 4). The splinted crowns were replaced by single unit provisional crowns in order to improve access. Frenectomy was completed followed by periodontal regeneration. Tooth #8 presented with a wall vertical defect and was grafted using a combination of xenograft and enamel matrix derivative (Engdogan, Straumann). At the 6-month post-operative, the patient presented with significantly improved clinical and radiographic parameters (Figure 5). Once periodontal stability was achieved she continued with the restorative phase.

Although many treatments and materials are available for closing diastemata, in this case a 3D digital wax up and a direct digital restoration approach was applied to align and equalize the space of the diastema between the laterals and canines to be more conservative while replacing the old splinted crowns with E-max crowns (Figure 6). The patient presented with a minimally invasive procedure and a more esthetically pleasing appearance. Patient agreed to start bleaching by using Opalescence 15% carbamide peroxide whitening gel prior to completing restorations. Estelite Omega composite BL2 were used for the direct veneers on 6, 7, 10 and 11. Digital Smile Design was used to preview the proportions and the space available by using Sirona InLab Smile Design software in combination with CEREC (Sirona) CAD/CAM design and in-house milling for emax crowns #8 and 9 that was cemented with Variolink Esthetic LC System.

Discussion

An ill-fitting restoration could lead to the development of periodontal disease. Periodontal stability must be obtained before proceeding with the final restoration. This type of esthetic procedure should be accomplished in cases of patients with excellent oral hygiene, and the restoration should be polished to a high gloss. Otherwise, there is a risk of losing control over gingival health because of the inflammatory process, which occurs on the surface of the teeth, and the restorations as the result of the presence of bacterial plaque. Regarding gingival esthetics, an aspect to be considered in the formation of interdental papilla is the presence of favorable gingival tissue. There should be minimum thickness of 3.0 to 5.0 mm of soft and elastic tissue, which allows its compression and settling. Lastly, to achieve an esthetic result, there should be a favorable interproximal length proportion for the execution of the restorative process. This concept is fundamental since an unbalance in the proportion of the anterior teeth is frequently observed after the closure of the diastema, which differs from the dimensions of the golden proportion concept. It is worth stressing that the visible width of an anterior upper tooth should not exceed 80% of its length.

Conclusions

Three-wall deep vertical periodontal defects are a predictable indication for periodontal regeneration. Adequate case selection is of paramount importance for a successful treatment of diastema closure. Digital smile design and mock-ups are a valuable tool for the patient and the clinician before the final restoration is delivered.

References