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Case Report

Smile designing using recurring esthetic dental proportion and aesthetic pre-evaluative temporary technique with porcelain laminate veneers: a case report

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ABSTRACT

Beautiful confident smile has a positive impact on the psychosocial well-being of patients. Spacing present in the anterior region makes a patient feel dissatisfied with their smile. Over the years, a number of innovative techniques have been described in the treatment of patient having spaces between teeth in the anterior region. However, a less invasive and short-time treatment procedure with satisfactory result is preferred by the patient. Laminates have a unique position in today's dental practice. These conservative restorations are especially important for young permanent dentitions. Porcelain veneers can be considered to be very much in cosmetic dentistry because they deal innumerable advantages over any previous form of veneering systems. This case report described the technique of closure of spaces between teeth in the anterior region by applying recurring esthetic dental (RED) proportion and aesthetic pre-evaluative temporary (APT) technique for smile designing using laminates. The RED proportion has been stated to be an essential tool for achieving esthetics and harmony in smile. The APT technique facilitated diagnosis, communication, and preparation, providing predictability for the restorative treatment. Limiting the preparation depth to the enamel surface significantly increases the performance of porcelain laminate veneers.

Keywords: Smile design, Esthetics, Laminates, APT technique, RED proportion, Cosmetic dentistry

INTRODUCTION

The greatest desire of patients when seeking dental treatment is the esthetic transformation of their smiles to include healthy and harmonious dentition. Due to increasing esthetic demand and possibility of joining laminated ceramic to the tooth structure (particularly enamel), a new concept was introduced i.e. minimally invasive restorative dentistry.[1] It is considered as one of the most conservative treatments for oral rehabilitation, as it requires minimal or no tooth preparation.[2,3] Ceramic laminate is capable of providing an extremely fine reproduction of natural teeth with great color stability and thicknesses ranging from 0.2 to 0.5 mm.[4] Laminate also offers biocompatibility with periodontal and dental substrates.[5,6]

CASE REPORT

A 24-year-old male patient was reported to the department of prosthodontics with the chief complaint of spacing in upper front teeth and wanted closure of the spaces. History revealed that a generalized spacing was present in between upper front teeth from childhood and it slowly increased with age. Intra-oral examination showed uniform spacing in the maxillary anterior teeth

(Figure 1). Various treatment options addressing the patient's presenting complaint were discussed with the patient and porcelain laminate veneers were planned for esthetic rehabilitation and informed written consent was obtained from patient. Maxillary and mandibular impressions were made to obtain the working casts. A diagnostic wax-up was done on unprepared casts. Tooth form was carefully adjusted to be in functional and esthetic harmony with the patient's lip and smile line according to RED proportion (Figure 2). Two silicone indices of the diagnostic wax-up were made: one for fabricating a direct composite provisional restoration and another for guiding the preparation (Figure 3). Anterior guidance was accessed and adjusted. The provisional restoration was mechanically retained with cervical undercuts from the interproximal area with spot etching. The speech and smile profiles were accessed with a provisional restoration. APT technique-guided tooth preparation was done. The facial tooth surface was prepared through provisional restoration using depth-cutting diamond burs, 0.5 mm and 0.8 mm, for differential preparation in the cervical and incisal regions respectively. Prepared depth grooves were marked to make them evident (Figure 4). The PT restoration was removed for final preparation and the teeth were prepared guided by marked depth grooves. The silicone index sectioned at the center of the tooth horizontally assisted in guiding the facial depth of preparation and the silicone index sectioned incisally assisted in guiding the incisal preparation. Markings on depth grooves prepared through provisional restorations of silicone putty indices in two planes. Prepared surfaces were finished. A gingival retraction was achieved and final impressions were made. The provisional restorations fabricated using silicone putty indices were luted. Further, bisque trial of final restorations was done. The final restorations were luted followed by liquid strip application to the cement line to prevent the formation of an oxygen inhibition layer.[10] The patient was instructed regarding oral hygiene. The esthetic outcome of the treatment was satisfactory (Figure 6). The treatment with veneers resulted in a highly predictable and professionally gratifying restoration. (Figure 7 and 8).

Figure 1: Intraoral view.

Figure 2: Recurring esthetic dental proportion.

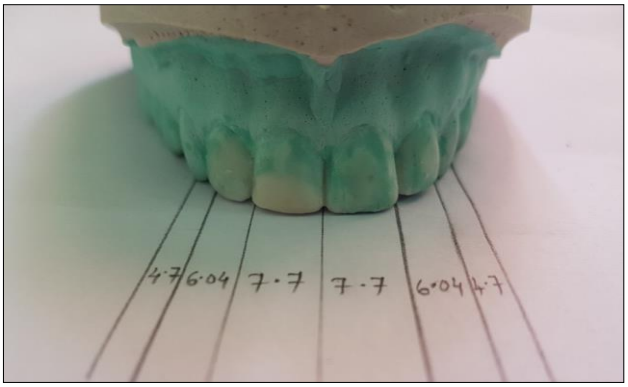

Figure 3: Silicone putty index.

Figure 4: Depth orientation grooves.

Figure 5: Final restoration.

Figure 6: In frontal view final outcome with the laminates cemented.

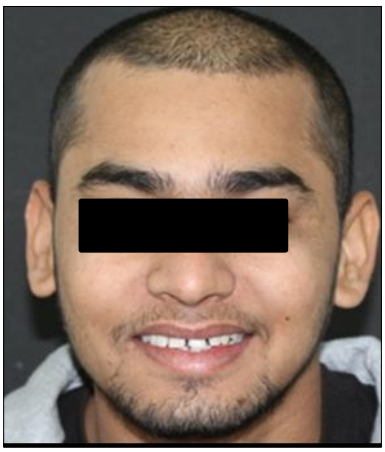

Figure 7: Pre-operative smile.

Figure 8: Post-operative smile.

DISCUSSION

Patients with unesthetic dental alignment often suffer from unpleasant smile and tend to have low self-esteem, which can affect their social life. With the recent advances in adhesive techniques and better-quality resin materials, dentists can have more chance to create conservative, functional, esthetic, economic, and long-lasting restorations with short chair-side time.[4] In this case, RED proportion was used for designing a proportional smile. The range of suggested RED proportions is between 62 and 80%. The golden proportion (62% RED proportion) is one of many proportions that fit within the definition of the RED proportion. Different RED proportions can be used for the same individual according to the desired length of the teeth and the desire to have the size of the teeth match the size of the face and body. It is recommended that the taller the individual and greater the incisocervical height of the teeth, the smaller will be the RED proportion. Taller individuals should have a 62% RED proportion, individuals with average height, a 70% RED proportion, and shorter individuals an 80% RED proportion.4Another important proportion to be evaluated is width-to-height ratio. A width-to-height ratio of 78% is found to be more pleasing.[5] In this case, since patient was of normal built, RED proportion of 70% and width-to-height ratio of 78% was considered ideal. With the aid of dental photography and FIVE dimensions, RED proportion and width-to-height ratio of tooth was evaluated (Figure 2). Based on the calculations, a proportional smile was designed. With the obtained ideal width and height of anterior teeth, direct composite buildup was used for space closure. Height of tooth was altered taking care that incisal edge approximated the contours of lower lip during smile.

The preparation limited to enamel imparts better mechanical interlocking with a more stable bond than that in dentin.[3-5] It may be attributed to a less homogenous nature, humidity, and the presence of areas of sclerosis later. Teeth with abrasion or erosion and those in older patients may have a thinner layer of enamel since they have lost some of their original volumes, and therefore create conditions under which the preservation of enamel is more complicated.[3,5-7] Teeth with discoloration demand a little more depth for tooth preparation. However, in the present case no such condition was present, and based on the diagnostic wax-up, the treatment plan was to restore the six maxillary anterior teeth with porcelain laminate veneers which are minimally invasive. The material property dictates a minimum ceramic thickness to provide the restoration with some intrinsic mechanical resistance. Their commended thicknesses are approximately <0.3 to 0.5 mm in the cervical area, 0.7 mm in the middle and incisal thirds, and a minimum of 1.5 mm for incisal.[6-8] Accurate achievement of such dimensions constitutes the most difficult aspect of preparation because these ultimate thicknesses are intimately related to the final volume and shape of the restoration.[7-9] Tooth-preparation techniques can be

divided into two groups according to their underlying principles: those driven by the existing tooth surface and those driven by the final volume of preparation. In techniques driven by the existing tooth surface, the ultimate goal is to remove a uniform layer of tooth achieved by freehand preparation and silicone guides of the existing tooth.[2] However, when the initial enamel is already thin, reduction based on the existing tooth surface can lead to significant dentin exposure which can be regarded as a possible cause of long-term failure of the restorations when not handled appropriately.[5] Whereas, in preparation driven by the final volume of restoration like the APT technique, a diagnostic wax-up that represents the final volume of the tooth is used as a reference for tooth preparation.[4] This saves a significant amount of sound hard tissue, not just enamel but also the critical dentin-enamel junction. The simplest and most important tool for tooth preparation in this technique is represented by a well-adapted silicone index sectioned in multiple planes (Figure 3). The APT technique is based on the "additive mock-up" design, which takes into consideration the final volume of the restoration and has allowed a greater number of dental preparations to be completely confined to the enamel (80.5%); whereas without the guide, dentist resorts to freehand preparation invariably exposing the dentin.[8,9] The best way to avoid unnecessary over-preparation is to prepare the tooth following the APT restoration.[3] In view of the reported advantages of the utilized RED proportion and APT technique, the preoperative and postoperative images show that the patient's esthetic requirements has been met successfully through a conservative approach (Figure 6-8).[9]

CONCLUSION

Porcelain laminate veneers are excellent esthetic treatment options that require considerably less tooth preparation than complete coverage coronal tooth preparation. The RED proportion for smile designing allows the clinician to obtain an acceptable range of width and height values of anterior tooth, providing a result that is likely to be esthetically accepted by the patients. The APT technique for tooth preparation takes into consideration the final volume of the restoration and allows a greater number of dental preparations to be completely confined to the enamel. In this case report, the patient's esthetic expectation was met by applying RED proportion for smile designing combined with the APT technique which offered the most conservative tooth preparation which significantly increased the clinical long-term performance of porcelain laminate veneers.

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