

Orthodontic Considerations Prior to Ceramic Veneers Placement: An Updated Review

Amjad Al Taki^{1*}, Omar Othman², Maha Hassan² and Reem Sh Abdelrahman³

¹Associate Professor and Specialist Orthodontist, Smile Spa Dental Clinic, United Arab Emirates

²Dentist, Private practice, Dubai, United Arab Emirates

³Department of Orthodontics, Ajman University of Science and Technology, United Arab Emirates

***Corresponding Author:** Amjad Al Taki, Associate Professor and Specialist Orthodontist, Smile Spa Dental Clinic, United Arab Emirates.

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Abstract

In the present scenario, the people's esthetic requirements and expectations have increased substantially. Hence, the dentists are faced with ever increasing demands to provide their patients with highly esthetic, durable tooth-colored restorations while maintaining a conservative approach to tooth reduction. Over the past 25 years, porcelain veneers have evolved into one of the most revolutionary treatment techniques in esthetic dentistry. Veneers can be used for changing the shape or color of the teeth, aligning the teeth, and replacing a pre-existing composite veneer for better esthetics. Patients seek such restorations for a variety of reasons ranging from a minor diastema to a complex malocclusion. Although many patients choose this treatment purely for cosmetic purposes, the dentist should aim at both functional and esthetic purposes. If one of the purposes is compromised, the case is prone to failure. Therefore, dentists should perform a complete examination of the patient before selecting and planning treatment. For optimum results, anesthetic treatment plan must take into account whether orthodontic movements will enhance the success or stability of the definitive restorations.

The underutilized combining procedures such as orthodontics and porcelain veneers provide conservative, predictable, esthetic, and functional results. Thus, the aim of this study was to emphasize the importance of orthodontic treatment in improving esthetic results obtained by porcelain veneers prior to their placement.

Keywords: Orthodontics; Veneers; Esthetics

Introduction

Porcelain veneers are being widely used in improving smile esthetics. However, it is necessary that the appropriate clinical steps to achieve the best outcomes [1]. This review specifically examines the treatment steps required before veneer placement in order to address various anatomical deviations and achieve the best results in terms of smile esthetics and functionality.

Asymmetric Gingival Heights

Smile esthetics depends on a number of factors, including the display and architecture of apparent gingival tissue and its contour. The appearance of the gingival contour follows the underlying bone architecture and is influenced primarily by factors such as tooth position, type of periodontium, tooth form, and design of the cemento-enamel junction (CEJ). Ideally, the maxillary central incisors are equal in length, and the lateral incisors are comparatively shorter. The gingival margin of the lateral incisor is located more incisally than on the central incisor. The maxillary canines are about the same length as the central incisors, and their cusp tips are located at the same level as the incisal edges of the centrals. The gingival margins of the canines are at the same height as those of the central incisors. In case of a substantial difference in crown length and gingival contour of the maxillary incisors, the esthetic appearance can be unsatisfactory depending on the teeth displayed on smiling. The discrepancy in crown length is accentuated if an incisor is abraded or fractured and allowed

to erupt carrying with it the entire periodontal tissues (compensatory extrusion: Figure 1a), or when a tooth has been substituted for a missing tooth. The gingiva around a tooth moves along with the tooth in the direction of orthodontic tooth movement. Thus, the esthetic appeal of the gingival contours and incisors crown lengths of such teeth can be improved through slow extrusion or selective intrusion of the appropriate teeth and either reduction or restoration of the incisal edges (Figures 2a, 2b) [2,3]. Previous studies have also shown that orthodontic treatment followed by restoration with veneers yields good results in cases of asymmetrical gingival lines [4].



Figure 1a: Pre-treatment intra-oral frontal view.



Figure 1b: Incognito™ Appliance in situ.



Figure 1c: Post-treatment intra-oral frontal view.

Midline Discrepancy

In the smile design process, the esthetic treatment plan often begins with the facial midline. The location of the maxillary midline relative to the facial soft-tissue midline is often stressed as an important factor in orthodontic diagnosis and treatment-planning procedures. Maxillary midline deviated from the facial soft-tissue midline has been commonly recorded (Figure 2a), presumably because such treatments in tend to make both the two midlines and the mandibular midline coincident (Figure 2b) [5]. Thus, the goal of the diagnosis is to localize and quantify the extent of the asymmetry.

Kokich, *et al.* [6] found that as long as the dental midline was parallel to the facial midline, even a 4 mm maxillary midline deviation was not detected by dentists and lay people. However a 2 mm deviation in incisor angulation (canted midline) was noticeable.

To ensure patient satisfaction, the dentist must inform the patient of his or her midline position before the treatment begins, even though correction with veneers may not be possible. Although midline appearance can be altered via restorations, the gingival tissue may not adjust to significant changes [7].

Therefore, to obtain ideal esthetic results, it's advisable to correct maxillary midline deviation orthodontically prior to ceramic veneers placement.



Figure 2a: Pre-treatment intra-oral frontal view.



Figure 2b: Post-treatment intra-oral frontal view.

Cross bites

An anterior dental cross bite is defined as a malocclusion resulting from the lingual positioning of one or more of the maxillary anterior teeth in relationship with the mandibular anterior teeth (Figures 3a, 3b) [8]. The potential problems associated with anterior cross bites include esthetics, enamel abrasion, tooth mobility, periodontal problems, and temporomandibular joint disturbance [9].

When planning for veneers, the incisal edge position should be noted. Teeth in an edge-to-edge or cross bite occlusal relationship are contraindicated for porcelain veneer restorations because of the excessive stress that later develops after the restoration, which eventually increases the risk of porcelain fracture and/or debond [10,11]. Therefore, the first step in orthodontic treatment is the correction of the anterior cross bite. The main goal of the orthodontic treatment is to tip the affected maxillary tooth or teeth labially to the point where a stable overbite and over jet relationship exists (Figures 3c-3e).

Various treatment methods have been proposed to correct anterior dental cross bite. Some of the common treatment methods include tongue blades, reversed stainless steel crown, fixed acrylic planes, bonded resin-composite inclined planes, removable appliances

with screw or finger springs, and fixed appliances [9,12]. Studies have shown that orthodontic therapy before veneer placement led to good clinical outcomes in cases of improper overbite and overjet [13].



Figure 3a: Pre-treatment intra-oral frontal view.



Figure 3b: Pre-treatment intra-oral occlusal view.



Figure 3c: In-Ovation L self-lighting brackets in situ.



Figure 3d: Post-treatment intra-oral frontal view.



Figure 3e: Post-treatment intra-oral occlusal view.

Bimaxillary Protrusion

Bimaxillary protrusion is a condition characterized by protrusive and proclined upper and lower incisors and an increased procumbency of lips (Figures 4a, 4b) [14].

A bimaxillary profile can compromise the esthetic demands of patients. The lips are a significant esthetic feature of the face. Under normal circumstances, an individual maintains his/her normal lip position in normal muscular tone and without excessive muscular contraction. The nasolabial angle is considered as the angle that depicts the esthetics and thus, has attained importance in treatment planning. It should be noted that patients with bimaxillary protrusion tend to demonstrate a decrease in nasolabial angle [14].

The application of porcelain veneers for improving the esthetic appeal of bimaxillary protrusion patients, such as closing of the spacing between teeth, will worsen lip competency. This is because porcelain veneers will increase the labial thickness of the proclined incisors.

Therefore, the orthodontic treatment of bimaxillary protrusion includes the retraction and retroclination of maxillary and mandibular incisors, resulting in a decrease in soft tissue procumbency and convexity. This is most commonly achieved by the extraction of four first premolars followed by the retraction of anterior teeth using maximum anchorage mechanics (Figures 4c, 4d) [14].



Figure 4a: Pre-treatment intra-oral right side view.



Figure 4b: Pre-treatment profile view.



Figure 4c: Post-treatment intra-oral right side view.



Figure 4d: Post-treatment profile view.

Moderate to Severe Diastema

Diastema is defined as a distance of more than 0.5 mm between the proximal surfaces of adjacent teeth. True midline diastema is defined as one without periodontal/periapical involvement and with the presence of all anterior teeth (Figure 5a) [15]. The condition affects esthetics of the smile and may also affect speech. Such cases require initial orthodontic treatment to close the diastema (Figure 5b). The esthetics in cases of severe diastema can be improved by employing an interdisciplinary approach that involves orthodontics, periodontology, and prosthodontics. If veneers are planned to be placed directly without orthodontic space closure, it would be necessary to enlarge the central incisors to close the diastema. This would compromise the conventional parameters considered to lend beauty to the smile including the width to height ratio and the golden proportions concept. Cooper, *et al.* [16] concluded that the width-to-height ratios for central incisors perceived as most attractive correspond with the higher end of ideal ratios proposed in the dental literature (75-80% width-to-height ratio). As per the golden proportions, the optimal apparent width of the lateral incisor should be

62% of the width of the central incisor [17]. Thus, to avoid significant deviation from these parameters, the timing of the various stages of treatment is of utmost importance. It should be noted that veneers should be prepared only after treatment is completed and the optimal positions of the teeth are achieved. Although some authors recommend the use of only ceramic restoration of teeth without tooth reduction [18], most authors concur with our opinion of orthodontic treatment followed by veneer placement [19].



Figure 5a: Pre-treatment intra-oral frontal view.



Figure 5b: Post-treatment intra-oral frontal view.

Moderate to Severe Crowding

The management of anterior crowding [20] is a challenge for many experienced esthetic dentists (Figures 6a-6c). In most cases, the correction of this condition may require a multidisciplinary approach involving only orthodontics, only veneers or a combination of both. While the use of veneers may help modify the tooth structure and color, it may still be inadequate for correcting crowding. If directly applied as the initial treatment step in cases of moderate to severe crowding, aggressive tooth preparation in addition to the removal of tooth structures would be required [21]. Many patients may not accept the aggressive approach or the tooth removal. Therefore, rather than opt for this aggressive, non-conservative approach, orthodontic treatment should be first undertaken and completed before veneer preparation is commenced (Figures 6d-6f). Completing the orthodontic treatment would allow for the optimal placement of the crowded teeth, thereby making the process of veneer placement less aggressive and invasive.

It is necessary that the merits and demerits of each treatment modality should be properly understood and accounted for before making the choice of the treatment strategy.



Figure 6a: Pre-treatment intra-oral frontal view.



Figure 6b: Pre-treatment intra-oral upper occlusal view.



Figure 6c: Pre-treatment intra-oral lower occlusal view.



Figure 6d: Post-treatment intra-oral frontal view.



Figure 6e: Post-treatment intra-oral upper occlusal view.



Figure 6f: Post-treatment intra-oral lower occlusal view.

Conclusions

Recent studies have shown that combined approaches using veneer placement with orthodontics yield good outcomes [22,23]. The importance of multidisciplinary approaches in achieving smile esthetics is increasingly being recognized [24].

From this review, the following points can be concluded:

1. Orthodontic extrusion or intrusion should be considered for the correction of gingival height asymmetry prior to porcelain veneer placement.
2. Midline asymmetries warrant special consideration in the orthodontic diagnosis and treatment planning process as the correction with veneers may not be possible.
3. Orthodontic treatment must be conducted first in edge-to-edge or cross bite relationship in to avoid ceramic veneer fracture due to high-stress forces.
4. Retraction of anterior teeth to reduce bimaxillary protrusion and soft tissue procumbency is highly recommended before the placement of ceramic veneers to achieve a more pleasant esthetics.
5. Placement of ceramic veneers in diastema cases prior to orthodontic closure may compromise the ideal maxillary central incisor width-to-height ratio and golden proportions ratio.
6. Orthodontic treatment aimed to resolve crowding can make the process of veneer placement less aggressive and invasive.

Thus, to achieve the best results in terms of both esthetics and functionality, it is necessary that each case be carefully reviewed and the treatment is planned using appropriate strategies.

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