Interdisciplinary management of diastema in maxillary anterior aesthetic zone with ceramic laminates – A case report

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Abstract

An esthetic smile is considered to be an asset to an individual's personality. Any deviation from the natural appearance compromises the facial aesthetics and diastema is one of the common deviations. Diastema not only distorts the pleasing smile by accentuating the observer's attention on it but also, deviate their attention from the rest of the dental composition. An unesthetic smile may cause self-consciousness, low self-esteem and repeated attempts to conceal perceived dental defects. Diastema may also change the airflow between the teeth leading to phonetic problem. Diastema closure is one of the challenging tasks and the treatment for its correction of may include periodontal surgery, orthodontic corrections, restoratives such as direct or indirect composite, partial or full crowns or ceramic laminate veneers or a combination of several therapies. The presented case report describes the procedure for diastema closure in the maxillary anterior region with an interdisciplinary approach using periodontal and restorative treatments.

Keywords: Crown lengthening procedure, Laminates, Multidisciplinary approach, Spacing in teeth.

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Introduction

In today's world of health awareness, every individual demands esthetic appearance. An esthetic smile is one of the factors which adds a positive impact to the subject's personality. Any deviation from the natural may compromise the facial aesthetics in the form of the spacing, Midline Diastema (MD), discoloration or the proclination etc. MD not only diverts observer's attention but also accentuate the their observation on the defect.[1]

MD psychologically affects the self-consciousness, causes low self-esteem and tends the patient to attempt to conceal the anatomical defect with lips. Diastema may also change the airflow between the teeth which results in difficulty in phonetics.[2] Various treatment modalities are available to correct the MD depending upon the dimensions of space, cause of spacing and occlusion etc. Sometimes, it may also require periodontal surgery or orthodontic correction.

Restorations such as direct or indirect composites, partial or full crowns or ceramic laminate veneers or combination of several modalities are available to correct the diastema.[3] This article presents a case report of diastema closure in maxillary incisors i.e. esthetic zone, using porcelain veneers with an interdisciplinary approach in which orthodontic therapy was not feasible. Superior aesthetics, biocompatibility, high strength, polishability and insolubility of ceramics are added advantages over the conventional composite esthetic restorations for correction of diastema.

Case Report

A 21-years-old healthy female patient reported to the Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai, with a chief complaint of spacing between her upper anterior teeth and visited the department for correction of the same to have an aesthetic smile. The patient also exhibited a high smile line. **[Figure IA]** On examination, there was spacing between maxillary central incisors and high frenal attachment along with short clinical crowns **[Figure IB].** For clinical evaluation, extraoral and intraoral photographs were taken and diagnostic casts were made.

Figure IA : Extra-oral photograph showing midline diastema.

Figure IB : Intraoral clinical photograph showing diastema in the maxillary anterior teeth.

The patient was referred to orthodontic consultation but unfortunately, orthodontic approach was not advised as the arch length was longer compared to the total width of the teeth. Also, all teeth were present in the arch and the patient was not willing to undergo any orthodontic treatment. Thus, esthetic rehabilitation of the patient using laminates was planned with indirect restoratives.

Considering the clinical examination and photographs and after consultation with the patient, it was decided that the diastema would be closed after correction of gingival disparity i.e. high frenum attachment and high gingival line. Porcelain laminates were opted as the treatment of choice, due to their natural esthetic appearance, ability to augment the length of incisors and longevity without constant maintenance.

After scaling and polishing, the patient was appointed for surgical crown lengthening and frenectomy due to high frenum attachment and short clinical crowns. Study mode was made and surgical stent was prepared for esthetic crown lengthening **[Figure IIA].** A surgical stent was prepared by marking the desired gingival contour on the study model. The margins of the stent simulated the gingival margin of the finish restoration. Local anesthesia was secured using 2% lignocaine with 1:200000 adrenaline. Gingivectomy was done with respect to teeth #13 to teeth #23 region after placement of the surgical stent using a no.15 surgical blade **[Figure IIB** and **IIC].** The periodontal flap was elevated with a periosteal elevator and maintaining the biologic width the required osseous reduction was done. Frenectomy was performed by giving two incisions one above the frenum and one below the frenum; followed by removal of a thick band of a frenum **[Figure II D].**

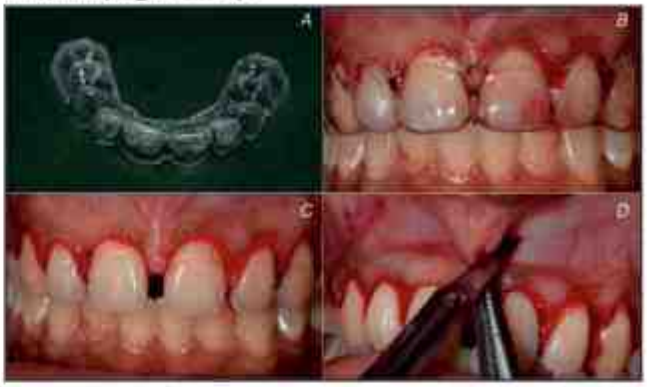

Figure IIA :Photograph showing surgical guide.
Figure IIB :Surgical guide in position to mark the gingival contour.
Figure IIC: Clinical photograph after crown lengthening procedure .
Figure IID :Clinical photograph showing frenectomy procedure.

The flap was approximated and sutured with 3-0 mersilk followed by covering it with periodontal pack (Coe-pak, GC, Europe). The patient was recalled after 7 days exhibiting satisfactory healing with no clinical symptoms. Clinically, adequate crown length was established with teeth #13 to teeth #23 region. The patient was recalled 15 days after the surgery for porcelain laminate preparation **[Figure III].**

Figure III: 2 weeks post surgical clinical photograph.

A mock-up restorative was prepared on the diagnostic cast and it was then transferred to the patient's mouth to evaluate the position of the final restoration. Three putty indices were made prior to tooth preparation for laminates. The teeth #11, #12, #21 and #22 were then prepared with the bevel type standard preparation for porcelain laminates. Preparation was done using 0.5 mm depth cutting bur and a chamfer bur. Proximal preparation was done up to palato-proximal line angle such that, the final restoration i.e. ceramic would cover the entire spacing. The buccal and the proximal preparation was done to 0.5mm with a chamfer finish line on the buccal surface and feather edge finish line

on palato-proximal line angle. To achieve desired translucency in the incisal edge area, 1mm of incisal preparation was also done. Preparation for tooth #22 was also modified to correct the rotation. A bevel type of incisal laminate preparation was followed on all the prepared teeth **[Figure IV].**

Figure IV : Clinical photograph showing bevel type laminate preparation in teeth no. # 21, #22, #11 and #12.

Putty indices were used as a guide, in which one of the putty index was cut along the long axis of the prepared tooth; to examine the depth and amount of preparation required. Another index was cut horizontally to examine the overall laminate preparation **[Figure VA , VB].**

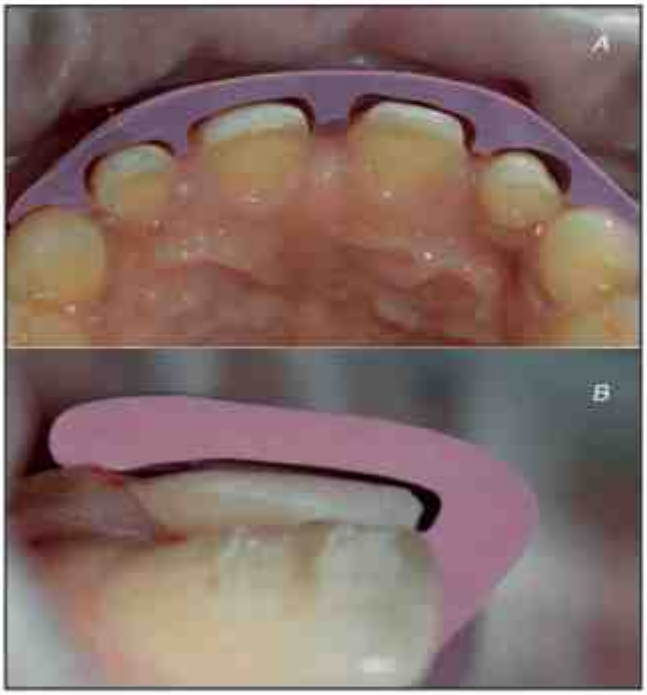

Figure VA : Occlusal view of customised putty index to visualise the tooth preparation.
Figure VB : Lateral view of customised putty index to visualise the tooth preparation.

After completion of the preparation, the gingival retraction cord (no.000) was placed and the impression was made using a two-stage impression technique with addition silicone material. Temporization was done using Luxatemp temporary crown material (DMG America LLC, Eaglewood) after spot etching and spot bonding the enamel surface.

Porcelain laminates were prepared by ultrasonic cleaning followed by etching the impression surface with 10% Hydrofluoric acid (HF). Tooth enamel surface was etched with 37% phosphoric acid followed by washing and drying. The dentin bonding agent was applied to the etched tooth surface. The silane-coupling agent was applied on the etched inner surface of the laminates without curing. Clear composite luting agent was then applied on the inner surface of laminates and the veneers were then placed on the tooth and cured. Curing was done first on the palatal side to reduce the polymerization shrinkage, followed by all other sides **(Figure VI A,B,C,D).**

Figure VIA : Clinical photograph showing labial view after cementation of porcelain laminates.
Figure VIB: Clinical photograph showing occlusal view.
Figure VIC : Clinical photograph showing right lateral view.
Figure VI D: Clinical photograph showing left lateral view.

Six months follow up of the patient revealed intact porcelain laminates with desirable healthy tissue response. **(Figure VII).**

Figure VII: Post operative extra-oral photograph after laminate cementation.

Discussion

In today's world of health awareness every individual desires to be fit and healthy. Oral health being an integral part of the general health, it is considered as a mirror to a good health. A pleasing smile not only affects the individual

socially but also influences psychologically. Tooth as a prime element of the smile, is the most influential factor to determine the overall appearance of an individual. The colour, size, shape and position of the maxillary central incisors play a vital role in the dental esthetics of an individual.

In order to appear pleasing, the maxillary central incisors must be in proportion to the facial morphology and be consistent to the arch.[4] In dentistry the term "Golden proportion" is used which is a mathematical theorem concerning the proportions of the dentition.[4,5] According to this rule, if the width of each anterior tooth is approximately 60% of the size of its adjacent anterior tooth, then it is considered aesthetically pleasing.[4-9] It follows logically that if the width of the lateral incisor is 1, the central incisor should be 1.618 times wider and the canine should be 0.618 times narrower.

With the increasing demands for esthetic restorations, it becomes necessary to introduce new esthetic restorative materials, possessing the combination of the strength and esthetic qualities when used in the anterior esthetic zone. For restorative correction of MD, various treatment options are available such as; direct composite veneer, indirect composite veneer, laminates, full-crown restorations, or porcelain laminates etc. Among these, composites may show discoloration, marginal leakage or frequent breakdown. Thus, porcelain laminates opted as the choice of material because it possesses both the strength and the resistance along with its esthetic qualities desired in anterior region.[7-10] Porcelain Laminate Veneers (PLVs) have become the esthetic alternative to the ceramic or the traditional porcelain-fused-to-metal crowns. Porcelain laminates have several advantages like; it requires conservative preparation, has life-like appearance and excellent tissue response. On the other hand, the full crown preparation would have been more invasive and require removal of additional healthy tooth structure.

In the present case, esthetic rehabilitation of MD and rotation was done with porcelain laminates using a minimalistic approach. Due to the presence of short clinical crowns and high smile line crown-lengthening procedure was also employed keeping in mind the width of the attached gingiva. Dealing with MD, is also associated with soft tissue challenge, because the teeth being treated are "mesialized."[8] In this case, the labial frenum was thick, fibrous and its attachment was high thus, required frenectomy. The gingival zeniths of the teeth were also moved mesially using customised surgical guide to provide the correct axial inclination of the final restoration.

In this case, three putty indices were made; out of which two were used as guide to check the amount of tooth preparation and to keep it as minimalistic as possible whereas; the third index was used for temporization purpose. These customized putty indices were acted as a guide for conservative laminate preparation. Tooth #22 also has minor rotation, which was corrected by including it in laminate preparation.

Conclusion

MD is a common dental malformation, which not only affects the facial aesthetics but also affects the individual socially and psychologically. Its correction is a matter of vital importance to the patient especially young adults which requires meticulous diagnosis, definite tooth preparation and sometimes surgical intervention. Porcelain veneers may be the choice of the treatment in the correction of MD due to their life-like appearance, strength and longevity.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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