



RESEARCH ARTICLE

ESTHETIC MANAGEMENT OF DIASTEMA CLOSURE USING PORCELAIN LAMINATE VENEERS AND ALL CERAMIC CROWN

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ARTICLE INFO

Article History:

Received 29th December, 2017
Received in revised form
06th January, 2018
Accepted 09th February, 2018
Published online 28th March, 2018

Key words:

Maxillary, Midline diastema,
Porcelain, Laminate veneer,
ESTHETICS.

ABSTRACT

Aim: This paper aims to describe the esthetic management of anterior midline diastema and spacing in a male patient, using a ceramic veneer and a crown.

Background: The use of ceramic veneers has increased due to the minimal tooth preparation involved, the color and contour stability of the material, and the enhanced esthetics. They have proven to be an effective treatment option for managing esthetic and functional problems, especially in the anterior teeth.

Case background: This case report describes an interdisciplinary approach used for a 28-year-old male with midline diastema. The interdisciplinary treatments included restorative and periodontic treatments.

Conclusion: All ceramic crown and porcelain laminate veneer were successfully applied to correct esthetic problems and achieve improved esthetic and functional outcomes.

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Citation: Dr. Geeta, I.B., Dr. Sadiya Naaz, A., Dr. Sreejith, S. and Dr. Apoorva Saxena, 2018. "Esthetic management of diastema closure using porcelain laminate veneers and all ceramic crown", *International Journal of Current Research*, 10, (03), 66584-66587.

INTRODUCTION

The concept of esthetics is a judgment about beauty and the sublime. Among aberrations in smile esthetics is the presence of diastemas, occasioned by differences in tooth-size. Maxillary midline diastema (MMD) is a common esthetic complaint of patients. MMD can be defined as a space greater than 0.5 mm between the proximal surfaces of the two central incisors (Keene, 1963). The space can be a normal growth characteristic during the primary and mixed dentition and generally is closed by the time the maxillary canines erupt. For some individuals, however, the diastema does not close spontaneously. It can be one of the most negative factors in self perceived dental appearance. Treatment is mainly for esthetic and psychological reasons, rather than functional ones (Bernabe, 2007). An interdisciplinary approach including periodontic, endodontic, orthodontic, and prosthodontic treatments is necessary to evaluate and solve esthetic problem (Claman 2003 and Spear, 2007).

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Esthetic treatment of diastema closure presents a challenge in clinical practice. One of the preferred treatment options for these problems includes thin shells of ceramics known as porcelain laminate veneers (PLV) and these can be bonded to the facial surface of anterior teeth using recent bonding agents and dual cure cements (Theodore, 2006). Veneers were introduced into dentistry around 1938 by Charles Pincus. With the introduction of acid etch technique by Buonocore in 1955 and silica resin direct filling material by Bowen in 1958, interest was generated in laminate veneers (Buonocore, 1955). Coupled with salinization of veneers and the introduction in the early 1980s of improved bonding agents, the results with porcelain laminate veneers have become more predictable. They are made of either by directly applying composite on the tooth surface or cementing processed composite, porcelain or pressed ceramic materials. This procedure is highly conservative considering the minimal amount of tooth preparation involved and creates excellent esthetic results in just two sittings. When these are bonded to enamel they take up the strength of enamel and become as strong as the natural tooth structure. This article reports a case of midline diastema conservatively managed with ceramic veneer and a crown, achieving the desired esthetic results.

Case Description

A 28 year old male patient reported to Department of Conservative dentistry and endodontics, Rajarajeswari Dental College and hospital with broken and discolored upper front tooth. Patient met with an accident two years back. On examination there was Ellis class III fracture 11, midline diastema between 11, 21, non-vital 11 and a high, fibrous and thick frenal attachment. Patient also desired to get his spacing closed additional to treatment of tooth required. There was no relevant history contributory to the existing diastema and all other routine investigations were within normal limits. Overjet and overbite were normal. The patient presented with sound periodontal conditions and no decay present. Treatment options given to patient were orthodontic closure of space and closure of space by Porcelain laminate Veneers (PLV). Patient opted for PLV considering the shorter duration of treatment protocols and less number of appointments. Root canal treatment 11 was performed and thick fibrous frenum was removed using electrocautery. Following frenectomy tooth preparation for all ceramic crown and veneer was prepared as follows. On a subsequent appointment 2 weeks later, maxillary anterior teeth were prepared to receive ceramic laminate veneers. The tooth preparation was performed at an enamel depth of 0.5-0.7 mm with 1.5 mm incisal reduction using a depth cutting tapered diamond bur (diameter, 1 mm). Chamfer finish line was maintained in the cervical region at the level of the gingival margin. The proximal preparation was extended beyond the contact area on the mesial surface of the central incisors to avoid the visibility of the tooth restoration junction and the appearance of a black triangle.

Chairside Impression

Gingival retraction was performed after finishing the sharp line and point angles (Ultrapak Cord #000, Ultradent Products Inc., South Jordan, UT, USA) in order to provide for gingival sulcus enlargement without using impregnated cords with hemostatic or astringent solutions. Impressions were taken using a vinyl polysiloxane material (Express XT, 3M ESPE, Seefeld, Germany); the light-bodied impression material was simultaneously spread on the teeth and gently blown over the preparation while the heavy-bodied impression was loaded in the plastic tray and inserted in the oral cavity. The impression material was allowed to set according to manufacturer's instructions and then removed.

Laboratory fabrication of veneers and cementation

After one week, the patient returned for placement of the final veneers. Ceramic laminate veneer restorations were fabricated with a lithium disilicate-reinforced glass ceramic material (IPS e.max Press, Ivoclar Vivadent, Liechtenstein) using the heat press technique. The prepared teeth were cleaned and the veneers were tried-in using a transparent try-in paste (Vario link Veneer try-in paste, Ivoclar). The margins of the veneers were checked for proper adaptation and patient satisfaction. Then, the internal surfaces of the veneers were cleaned and etched with hydrofluoric acid (ceramic Etchant 9.5%, Bisco Inc., Schaumburg, IL, USA) for one min, washed under running water for another minute, and dried with an air syringe. Monobond-plus (Ivoclar Vivadent, Schaan, Liechtenstein) was applied and left to react for 60 s before air drying.



Figure 1. Pre-operative image showing Ellis class III, mid-line diastema and thick frenal attachment



Figure 2. Frenectomy done using electrocautery



Figure 3. Tooth preparation done for crown and veneer in relation to 11, 21 respectively

DISCUSSION

The closure of diastemas is recognized as one of the most common and challenging tasks in restorative dentistry. Diastemas can occur during normal dental development starting from the mixed dentition period (Moon, 2010).



Figure 4. Temporary crown cementation done in relation to 11, 21



Figure 5. Post-operative image after cementation of crown and veneer in relation to 11, 21 respectively

Midline diastema could be transient or created by developmental, pathological, or iatrogenic factors such as mesiodens, microdontia, hypodontia, abnormal oral habits, enlarge frenum, etc. The continuous appearance of diastemas between maxillary anterior teeth has been associated with both esthetics and malocclusion (Moon, 2010). Anterior diastema is defined as "anterior midline spacing greater than 0.5 mm between the proximal surface of adjacent anterior teeth" (Keene, 2011). Proper examination and patient selection, accurate diagnosis and effective oral hygiene using a range of restorative and orthodontic methods are required for the effective treatment of anterior diastemas (Chu, 2011). The restorative closure of diastema can be achieved by using any of the techniques mentioned; direct composite veneers, indirect composite veneers, porcelain laminate veneers, all ceramic crowns, metal ceramic crowns and composite crowns. Porcelain laminate veneers (PLVs) have become the alternative to composite restorations ceramic crowns and the traditional porcelain-fused-to-metal (Touati, 1999). Smiles can be transformed painlessly, conservatively and quickly with dramatic, long-lasting results with the successful use of the porcelain laminate veneer. Tissue response is excellent, and the finished surface is very similar to the natural tooth. Veneers exhibit natural fluorescence and absorb, reflect, and transmit light exactly as does the natural tooth structure. The subsequent introduction of special acid etching techniques

improved the long-term retention of veneers (Kihn, 1998) Simonsen and Calamia demonstrated that the bond strength of hydrofluoric acid-etched and silanated veneer to the luting resin composite is generally greater than the bond strength of the same luting resin to the etched enamel surface (Calamia, 1984). Pressable ceramic was preferred in the cases shown here which had the following advantages: a) safe, b) highly esthetic c) less work time, d) firm fit, e) long-term success, f) large indications. However, porcelain laminates have their own limitations too. They should not be used when remaining enamel is inadequate to provide adequate retention. Esthetics is adversely affected by diastemas and the prescribed technique may be used to close a wide range of midline diastema without compromising the esthetics and stability of treated outcome (Namdar, 1999). The estimated survival probability of porcelain laminate veneers over a period of 10 years is 91% (Dumfahrt, 2000 and Frese, 2012). The presented case reports justifies the choice of diastema closure using PLV and a crown, because all the patients had difficulty in social interaction due to poor appearance and requested for immediate results. The recovery of function and smile esthetics of a patient with maxillary diastemas with PLV allowed excellent results with conservative preparations. Detailed planning, correct selection of dental materials, and quality communication with the prosthetic technician contributed to a harmonious smile and the evident satisfaction of both patient and professionals.

Conclusion

Ceramic veneers may prove to be effective in closing diastemas and should therefore, be considered as one of the main options during treatment planning.

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