

DIASTEMATA CORRECTION IN THE AESTHETIC ZONE BY CERAMIC VENEERS**Dr. Isha Gupta¹, Dr. Kundabala M.*² and Dr. Neeta Shetty³**¹Postgraduate student, Department of Conservative Dentistry and Endodontics,²Professor, Department of Conservative Dentistry and Endodontics,³Professor and Head, Department of Conservative Dentistry and Endodontics,Manipal College of Dental Sciences, Mangalore, Affiliated to Manipal Academy of Higher Education (MAHE),
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Article Received on 08/02/2019

Article Revised on 01/03/2019

Article Accepted on 22/03/2019

ABSTRACT

Ceramic veneers are considered to be a superior treatment option for discoloured teeth requiring a midline line diastema closure. It is an excellent esthetic, permanent clinical treatment option to improve smile and overall appearance of the patient. The current ceramics exhibit a good flexural strength, fracture resistance and high optical properties which are much superior than composite resin. Advancements in luting materials with better adhesive properties have made it long lasting and easier for veneers to adhere to prepared teeth. Since bonding is technique sensitive, each step is crucial which requires utmost clinical care. This case report presents an aesthetic management of midline diastema of discoloured teeth by multidisciplinary approach with crown lengthening and indirect ceramic veneers.

KEYWORDS: Midline diastema, Ceramic veneers, Esthetic enhancement, Multidisciplinary approach.**INTRODUCTION**

Smile is the ability of an individual to express emotions with the help of teeth and lips.^[1] The appearance of the dentition plays a major role in individual's confident function in the society. However, teeth exhibiting certain factors such as missing, spaced, discoloured, proclined, fractured, malocclusion, carious, microdontia, hereditary and systemic conditions etc. are responsible for alteration in the perfect dentition. A customized treatment plan and multidisciplinary treatment approach is to be followed in designing a perfect smile to be followed to improve the person's smile, thus improving confidence of the patient.

Diastema is a space/gap between two teeth. This space between teeth can be physiological during the primary and mixed dentition periods and is closed with the eruption of adjacent teeth. In some individuals however this closure does not occur spontaneously. Factors responsible for this could be hereditary (congenitally missing teeth, tooth and jaw size discrepancy, supernumerary teeth & frenum attachments) or other developmental problems (habits, periodontal disease, tooth loss, posterior bite collapse). The various treatment options for diastema closure include orthodontic closure, restorative therapy, surgical correction or multidisciplinary approach depending upon the cause of diastema.^[2]

Restorative options for diastema closure involve the use of direct composite veneers, indirect composite veneers, porcelain laminate veneers, and full coverage crowns. The clinical considerations for diastemata include aesthetic parameters such as tooth to tooth proportion, tooth proportion, incisal edge position, gingival zenith and tooth-gingiva positions and proportions. Restoration using ceramic veneers allows biomimetic recovery of the dental esthetics with proper form, function and position in the arch. The following case presents the esthetic management of midline diastema by crown lengthening and indirect ceramic veneers.^[3]

CASE REPORT

A 29 year old patient presented to the Department of Conservative Dentistry and Endodontics with the chief complaint of spacing between the upper front teeth and generalised yellowish discolouration of the teeth.(Figure 1) The patient was unhappy with the appearance of his teeth and wanted esthetic rehabilitation. The medical and family history was non contributory. Patient had the habit of smoking tobacco and chewing betel since last 7 years. Spacing was noticed between 11 and 21, 12 and 13, 22 and 23.(Figure 1&2)Yellowish brown discolouration was seen on cervical third of the crowns of both maxillary and mandibular teeth. A final diagnosis of multiple diastema in relation to upper anterior teeth

with generalized mild fluorosis and internalisation of extrinsic stains was made. Treatment options provided were orthodontic treatment for space closure followed by direct composite veneers, vital all-ceramic crowns or porcelain laminate veneers. Porcelain laminate veneers were chosen with respect to teeth no. 11, 21, 12, 22, 13 and 23 for correction of both diastema and the discolouration. Before proceeding for tooth preparation, shade was selected using Vitapan Classical shade guide. A3 shade was selected cervically and A2 for the middle and the incisal thirds. (Figure 3)

Methodology

Upper and lower arch primary impressions were made with alginate and study casts were prepared. Wax mock was done on the study models to (Figure 4) modify the shape and size of the restorations with the help of a diagnostic wax. After approval from the patient, tooth preparation was done following gingival zenith correction with respect to 11.

1) Veneer preparation

0.5mm to 1mm of reduction was done labially using a flat end tapered diamond bur (N0 and manufacturer details). Window preparation design was carried out in all the teeth. The proximal preparation was extended beyond the contact area to labial embrasure to avoid visibility of the tooth restoration junction. The chamfer finish lines were kept at the level of gingival margin for all the teeth. All sharp angles of the preparation were rounded off and any friable enamel was removed. The stump shade was selected as A2 in both the cases.

2) Impression technique and temporaries

Gingival retraction cord was placed before taking the impression. Single step double mix technique using addition silicone (manufacturer details) putty and wash impression technique was used. (Figure 5) Using the Putty index which was prepared was taken on the mock up cast used to prepare temporary restoration using Protemp (Manufacturers' details). (Figure 6).

3) Cementation

The temporary veneers were removed. The teeth were cleaned using pumice and were dried. The ceramic veneers prepared using lithium disilicate (IPS-E max Manufacture details) were tried on to the master cast and teeth to verify color, marginal adaptation and fit. (Fig. 7) The veneers were removed from the tooth, rinsed thoroughly, and dried. Variolink N Intro Pack kit was used for the cementation according to manufacturer's instructions as follows.

i) Conditioning of ceramic surface

The veneers were etched with 4.5% hydrofluoric acid for 20 sec and then rinsed with water. (Fig.8) A thin layer of silane coupling agent (monobond N) was applied to the internal veneer surface for 60s and air-dried.

ii) Tooth conditioning

Simultaneously, etching of teeth with Total Etch technique using 37%, phosphoric acid etching gel on the

tooth surface for 60 sec on enamel was carried out followed by thorough rinsing and air drying. (Fig.9) Bonding agent was applied. No curing was done. (Fig 10).

iii) Cementation (Final)

Variolink N base and catalyst were dispensed on a mixing pad in the ratio of 1:1. They were mixed for 10sec just prior to the application. The material was loaded on to the laminates taking care not to incorporate any air bubbles. The laminates were then gently placed one by one from mesial to distal tooth in both the quadrants with little pressure till they were completely seated till the finish line. The excess cement was removed with a sharp instrument. Tack curing was done for 2-3 seconds over the central area of the veneers. Further excess cement was removed by a sharp instrument. The teeth were flossed for the presence of any loose cement or debris. (Fig 11) Final curing was done both facially and lingually for 40 seconds respectively. (Fig.12).

4) Finishing of the restoration

Finishing and polishing strips were applied in the proximal region. The occlusion was checked and adjustments were done. So flex was used for final polishing. Finally all the diastemas were closed with esthetic improvement of discoloured teeth was achieved with ceramic veneers. (Fig.13).

DISCUSSION

The crucial aspect in a treatment planning pertaining to dental aesthetics include aesthetic parameters such as tooth proportion, tooth to tooth proportion, incisal edge position, gingival architecture and occlusion. Several cases pertaining to spaced teeth have been reported. However, the treatment modality in treating this diastema correction is a challenging procedure where a major morphologic modification is required (Type II B classification by Pascal Magne). The ceramic veneers were indicated due to intraoral criteria such as good oral hygiene maintenance, healthy gingival tissues, no occlusal interferences and patient motivation to maintain. The estimated survival probability of a porcelain laminate veneers over a period of 10 years is said to be around 91%.^[4]

While planning the treatment for cases where esthetics is the main concern, shade selection is very crucial as the ceramic laminates replaces enamel which acts like a window reflecting and refracting light waves. Controlling value for a discoloured dentition is best addressed using a lithium disilicate restorative material. The pressed core possesses adequate capacity to effectively mask very dark, low value areas.

Finish lines were placed juxtagingivally and the interproximal finish lines were created palatally to the interproximal contact zones which could provide transitional line angles prominent that helped to reflect the natural light and gave an aesthetically pleasing appearance. A proximal contact combined with palatal butt margin provides a horizontal insertion path of the veneer. The incisal and middle third preparation were maintained at a depth of 0.5mm and cervically 0.2mm due to thin the enamel present. To provide a natural healthy look for the anteriors that mimics true convex nature, a uniform removal of substrate is essential and can be achieved through the use of the bur, keeping it at three different angles. Gingival deflection was carried out at least 5 to 10 minutes prior to impression taking to allow the retraction cord to expand by water sorption providing vertical retraction of gingival tissue.^[5]

Polyvinyl siloxane impression material used in this case sets by addition reaction with no formation of volatile by-products. The polymerisation shrinkage is thus reduced improving the dimensional stability and may remain dimensionally stable even up to 7days. These materials contain scavengers like platinum or palladium which prevents hydrogen release that can cause bubbles in the final cast. Custom tray provides more accurate intraoral positioning, requires less heavy body material. In this case one step, single mix application mode was carried out for provisional restoration. A rigid silicone matrix loaded with self curing acrylic resin was used because of their elasticity and favourable handling properties.

Lithium disilicate ceramics are acid sensitive which improved mechanical fracture resistance, improved thermal shock resistance, and resistance to corrosion. The flexure strength of glass based ceramics were improved by 320 - 450 MPa.^[6] Cementation of veneers with dual cure cement ensures durability, marginal seal and retention. Adhesively cemented all ceramic restorations provide higher resistance to fracture than those cemented conventionally with zinc phosphate or glass ionomer cement. Etching with hydrofluoric acid was carried out as it provides an increased surface area, micromechanical retention and a clean surface for adhesive cementation. Silane solution acts as coupling agent which increases the wettability of the resin cement and interacts chemically with both the resin matrix and the hydroxylated ceramic surface. The curing of the bonding agent was not done as if not air blown properly, a thick layer of bonding agent will result in improper seating of the restoration.

Similar case to improve the esthetics, minimally invasive techniques are used by resin infiltration technique, bleaching treatment and a laminate veneer restoration on a patient with hypomineralization and Turner's hypoplasia. Also, Porcelain laminate veneers were given using CAD/CAM that provided with both esthetic and functional results.^[7]

In conclusion, midline diastema of discoloured teeth can be restored esthetically using minimally invasive approach by ceramic veneers. Proper case selection, proper ceramic material selection, precise tooth preparation and proper cementation of restorations will definitely give long term success of treatment.





Figures: Process of treatment (Fig.1-12)



Pre and post treatment photographs.

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