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Case Report

Conservative and esthetic management of diastema closure using porcelain laminate veneers

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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.[1] 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.[2]

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.[3] Veneers were introduced into dentistry around 1938 by Charles Pincus. With the introduction of acid etch technique by Buonocore in1955 and silica resin direct filling material by Bowen in 1958, interest was generated in laminate veneers.[4] Coupled with silanization of veneers and the introduction in the early 1980s of improved bonding agents, the results with PLV 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 three cases of midline diastema conservatively managed with ceramic veneers, achieving the desired esthetic results.

Case reports

Case 1

A 33 year old male patient presented with chief complaint of spacing in his upper front teeth and desired to have his teeth cosmetically corrected. There was no relevant history contributory to the existing diastema and all other routine investigations were within normal limits. On intra oral examination patient was having midline diastema of 4 mm.

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Overjet and overbite were normal. The patient presented with sound periodontal conditions and no decay present .On comparing size of central incisors with lateral incisors it was found that proportion was mismatched because of smaller size of centrals. Treatment options given to patient were orthodontic closure of space and closure of space by PLV. Patient opted for PLV considering the shorter duration of treatment protocols and less number of appointments. The clinical protocols involved in closure of midline diastema using ceramic veneers are explained in the subsequent paragraphs following a brief history of remaining two cases.

Case 2

A 21 year old female patient reported with chief complaint that she did not like her smile because of spacing between her upper teeth. Clinical examination revealed class I malocclusion with midline spacing of 3 mm limited to upper central incisors. The amount of overjet and overbite were 3 and 2 mm, respectively. There was full complement of teeth with normal attachment of midline frenum. Oral hygiene was satisfactory. Radiographic examination ruled out presence of any unerupted supernumerary tooth or mesiodens. Various treatment alternatives such as fixed or removable orthodontic appliances and the patient's affordability in terms of treatment time were discussed in detail. However, due to prolonged treatment and aesthetic issues related to these appliances, patient did not give her consent to these treatment modalities. The space was managed with porcelain laminate veneers after getting informed consent.

Case 3

A 24 year old female patient presented to us with a desire to improve her unaesthetic facial appearance due to 'gaps' present between her front teeth. The patient was unhappy with the appearance of her teeth and restrained herself from smiling due to self-consciousness. The patient's medical history was non-contributory and all routine investigations including blood, urine and radiographs were within normal limits. She has a healthy full complement of teeth with no caries or periodontal disease. Clinical examination revealed class I malocclusion with midline spacing of 3 mm limited to upper central incisors. All the treatment options were discussed with the patient. As the patient was unwilling for long-term fixed orthodontic therapy, a conservative, esthetic procedure using porcelain laminate veneers was selected.

Treatment protocols

The clinical and laboratory protocols carried out were the same for all the cases. During the initial appointment, diagnostic impressions were made using irreversible hydrocolloid (Algitex, DPI, India), poured with Type IV dental stone (Kalabhai, India) and stone casts retrieved for a comprehensive treatment planning. One set of study models was used for wax up of the central incisors alone. On the second set of study cast, mock preparations were done in relation to 11 & 21. Smile design was carried out, explained to the patient, after getting informed consent, the treatment protocols were started. At the onset of the treatment, thorough scaling and polishing was done. Before proceeding for tooth preparation, shade was selected using Vitapan Classical shade guide (Vita Zahnfabrik, Germany). The veneer preparations started with placement of depth cuts (Fig. 1A). The veneer margins were then established using long, tapered medium grit diamond to prepare definitive chamfer 0.3–0.4 mm deep at the gingival margin (Fig. 1B). Tooth contacts were removed and the entire gingivo-proximal definitive chamfer margins were established. The preparation design porcelain should allow a thickness of 0.5 mm at the gingival margin, 0.7 mm in the mid-body and at least 1 mm in the incisal third to prevent dentin shine-through and to conceal the silhouette of the preparation under the porcelain and the same principle was followed in preparation.

The incisal edges were reduced 1 mm, 30° toward the lingual surfaces in relation to 11 & 21 with slight lingual wrap away from centric contacts. A final impression was made using a 2-step polyvinyl impression technique (Affinis, ColtèneWhaledent) (Fig. 1C) and sent to the lab .Provisional restorations were done using direct light cure composite build up with spot etching. Pressable ceramic, glass-ceramic lithium disilicate was used (IPSe.maxPress, Ivoclar Vivadent) for fabrication of PLV (Fig. 1D) in the lab. The internal surfaces of the veneers were etched with 9.5% hydrofluoric acid (Ultradent, Germany) for 20 s and the veneers were silanized with a silane coupling agent (Monobond Plus, Ivoclar Vivadent) before luting. The tooth surface was cleaned using slurry of pumice and gingival displacement obtained using retraction cord (#000 Ultradent, Germany). Acid etching was done with 37% phosphoric acid (Total Etch, Ivoclar Vivadent) and the etchant was thoroughly rinsed off after a duration of 15 s following manufacturers recommendations .All the teeth surfaces and inner surface of veneers were coated with bonding agent in thin layer and light polymerized for 25–30 s. Dual cure composite luting agent (Variolink-II, Ivoclar) of appropriate shade was selected and placed in the inner surface of porcelain veneers. Veneers with luting cement were placed on the teeth surfaces, margins were checked for proper seating, pressure was applied and initial polymerization was done for 5 s to remove excess luting agent and cured for 60 s on each tooth. Extra-fine diamond points were used to refine the margins. There was considerable improvement in overall appearance of the patients in terms of esthetics as seen in post rehabilitation photographs (Figs. 2–4).

Discussion

Midline diastema could be transient or created by developmental, pathological, or iatrogenic factors such as mesiodens, microdontia, hypodontia, abnormal oral habits, enlarge frenum, etc. Because of the potential for multiple etiologies, the diagnosis of a diastema must be based on a thorough medical/dental history, clinical examination, and radiographic survey. Different treatment modalities include removable orthodontic appliances, full arch, single arch or sectional fixed orthodontic appliances, excision of the frenum, restoration techniques, extraction of mesiodens,