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RESEARCH ARTICLE

ESTHETIC AND CONSERVATIVE MANAGEMENT OF CONGENITALLY MISSING MAXILLARY LATERAL INCISORS USING PORCELAIN LAMINATE VENEERS - A CASE REPORT

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ABSTRACT

Congenitally missing teeth, particularly the maxillary lateral incisor present dental clinicians with numerous challenges. These involve treatment planning and smile design; preparation; patient perceptions and expectations relative to aesthetics; interdisciplinary collaboration that meets the functional, health and aesthetic needs and, a critical factor for the overall success, that of choosing a suitable restorative material. This manuscript reports a case describing esthetic anterior dental rehabilitation for congenitally missing maxillary lateral incisors with diastemas using Lithium disilicate – reinforced ceramic veneers.

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INTRODUCTION

Esthetic dental treatment can enhance a patient's own intensely personal image of how he or she looks and how he or she would like to look. As Frush observes, "A smile can be attractive, a prime asset to a person's appearance, and it can be a powerful factor in the ego and desirable life experiences of a human being. It cannot be treated with indifference because of its deep emotional significance" (Goldstein, 2006). Among aberrations in the smile esthetics is the presence of diastema. Diastema 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 (Viswambaran *et al.,* 2014). Various dental treatment protocols are available for conditions involving the anterior sextant where the esthetics is involved. These mainly include composite restorations, porcelain restorations and orthodontic treatment. Direct restoration with composite resin has advantages such as conservation of tooth tissue, low cost, reversibility, and a relatively simple technique (Heymann and Hershey, 1985). However, for extensive tooth reconstruction, composites have a high failure rate (Tuncer *et al.,* 2013), averaging 2.9% annually. This can be due to secondary caries, loss of restoration, pigment impregnation, fracture, marginal defects (Kopperud *et al.,* 2012), or a high degree of color instability (Garoushi *et al.,* 2013). Even though orthodontic treatment is a viable option, most adults do not want to spend several years and multiple appointments to enhance their smiles (Poss, 2002).

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One of the preferred treatment option includes thin shells of ceramics known as Porcelain Laminate Veneers and these can be bonded to the facial surface of anterior teeth using resin bond cements (Heymann and Hershey, 1985; Ferreira *et al.,* 2014). With the advances in ceramic materials, adhesive technology and clinical techniques, the use of ceramic restorations has become a wide spread, reliable and successful technique of minimally invasive esthetic dentistry (Zarone *et al.,* 2005). Ceramic veneers foster greater preservation of tooth structure, maintain tooth vitality and produce predictable results (Edelhoff and Sorensen, 2002; Zhang *et al.,* 2000). The estimated survival probability of porcelain laminate veneers over a period of 10 years is 91% (Dumfahrt and Schaffer, 2000). This manuscript reports a case describing esthetic anterior dental rehabilitation for congenitally missing maxillary lateral incisors using Lithium disilicate – reinforced ceramic veneers.

CASE REPORT

A 21 year old female reported to the Department of Prosthodontics, Subharti Dental College, Meerut with the chief complaint of unattractive smile owing to "gaps" in between her upper front teeth region.

On clinical examination, it was seen that:

1. There were diastemas present in relation to maxillary anterior teeth i.e. 11, 21,13 and 23 (11- maxillary right central incisor, 21- maxillary left central incisor, 13- maxillary right canine and 23- maxillary left canine) of around 2mm each.

2. Both right and left maxillary lateral incisors were missing
3. Overjet and overbite were in the normal range
4. Occlusion was satisfactory
5. Sound periodontal health and no decay of teeth
6. The gingival margins of maxillary right and left central incisors were not at the same level i.e. the width/length ratio of maxillary right central incisor was around 60% and thus needed correction (Fig. 1).

Fig. 1. Pre operative baseline situation

On radiographic examination, orthopentomogram confirmed the absence of both right and left maxillary lateral incisors in the upper jaw. Following this, irreversible hydrocolloid impressions were made for both the arches and the study models were prepared. Extraoral and intraoral photographs were also taken. Various treatment options were discussed with the patient. The patient was unwilling for any long term fixed orthodontic therapy and implant surgery for the missing maxillary right and left lateral incisors. Based upon the examination, evaluation and patient desire, a conservative treatment approach using indirect lithium disilicate veeners was selected. A mock preparation was done on maxillary study model. All four maxillary anterior teeth including central incisors and canines were prepared minimally and a final diagnostic wax set up was done in which canines were reshaped to look like lateral incisors (Fig. 2). This set up helped the patient to have a satisfactory idea to what her smile would look like after the "gaps" were closed.

Fig. 2. Diagnostic wax up

Treatment procedure

At the onset of treatment, thorough scaling and polishing was carried out. Following this, the clinical crown of 11 was lengthened surgically to match that of 21 (width/length ratio was brought to around 75%) and the patient was recalled after two weeks so that the gingival healing could take place sufficiently. At next appointment, before proceeding for tooth preparation, shade selection was done using VITA-PAN classical shade guide. Both central incisors and canines were then prepared to receive porcelain laminate veeners. The tooth preparation was kept in enamel at a depth of 0.5mm using a depth cutting diamond and a tapered diamond bur of 0.1mm in diameter. A 0.3 to 0.4mm deep chamfer was maintained in the cervical region. The chamfer finish lines were kept at the level of gingival margins. The proximal preparation was extended beyond the contact area to avoid the visibility of the tooth restoration junction (Fig. 3).

Fig. 3. Tooth preparations (labial view)

Gingival retraction was performed after finishing the sharp line angles and point angles. The incisal edges were reduced by around 1mm, 30 degrees towards lingual surfaces with a palatal wrap away from the centric contacts (Fig. 4).

Fig. 4. Tooth preparations (lingual view)

Slightly more incisal reduction of both the canines had to be done so as to shape them as lateral incisors in the final outcome. A final impression was made using a two step polyvinyl rubber based impression technique and was sent to the laboratory (Fig. 5).

Fig. 5 Upper and Lower rubber based impressions

Provisional acrylic veeners were prepared indirectly and cemented using TEMPOSIL 2 onto the prepared teeth (Fig. 6).

Fig. 6. Cemented Provisional acrylic veneers

The final Porcelain veneers were fabricated using the IPS EMPRESS 2 SYSTEM (Emax, Ivoclar Vivadent) in the laboratory (Fig. 7& 8).

Fig. 7&8. Porcelain veneers on model

In the next appointment, the provisional restoration and temporary cement was removed carefully. Then, the Porcelain veeners were tried in for shade, fit, marginal adaptation, shape size, symmetry and contacts using petroleum jelly as a holding medium. After their satisfactory trial, cementation protocol was commenced. The internal surfaces of the four veeners were etched using 9.5% hydrofluoric acid (Ultradent, Germany) for 20 seconds (Fig. 9), immediately rinsed with distilled water.

Fig. 9. Etched internal surface of porcelain veneer

The surfaces were air dried and a silane coupling agent (Monobond plus, Ivoclar Vivadent) was applied in two layers and dried. A layer of adhesive (Excite DSC, Ivoclar Vivadent) was added, which was not light –cured, to enhance adaptation. The prepared tooth surfaces were cleaned using pumice slurry and gingival retraction was done using retraction cord (#000 Ultradent, Germany). The prepared teeth were etched using 37% phosphoric acid (Total etch, Ivoclar Vivadent) for 15 seconds, immediately washed with distilled water for 60 seconds and air – dried. The adhesive was applied (Excite DSC, Ivoclar Vivadent) without curing. A resin based composite luting agent, Variolink-II, Ivoclar Vivadent (Fig. 10) was added and all the veneers were carefully postioned together.

Fig. 10. Resin based composite luting kit

The margins were checked for proper seating, pressure was applied and initial polymerization was done for 5 seconds. Excess luting agent was removed and cured for 60 seconds for each tooth. Finally, occlusal interferences on veneers were checked and removed in centric and eccentric positions (Fig. 11, 12 & 13).

Fig. 11, 12 & 13. Cemented veneers when mandible in Protrusive position, Right lateral position of mandible & Left lateral position of mandible

A perfect harmony was achieved between porcelain veneers and the remaining teeth, highlighting the naturalness and biomimetics of the restorations, while also achieving the expectations and wishes of the patient for a more esthetic smile (Fig. 14, 15).

Fig. 14&15 Ceramic veneers during centric occlusion & Palatal view of cemented veneers

The before and after treatment pictures show a marked esthetic improvement (Fig 16, 17).

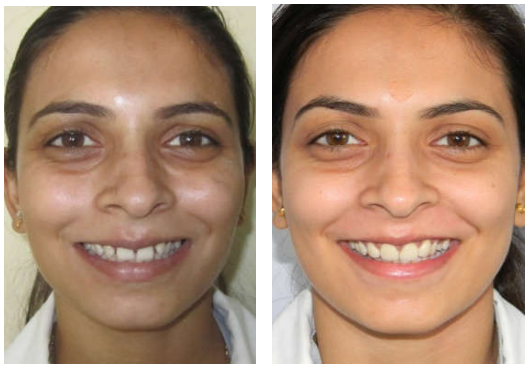

Fig. 16 &17. Pre operative smile of patient & Post operative smile of patient

DISCUSSION

Esthetics is adversely affected by diastemas; which affects from 1.5% to 2% of the population (Namdar and Atasu, 1999). The maxillary lateral incisor is the second most common congenitally absent tooth. There are three treatment options that exist for replacing missing lateral incisors. They include canine substitution, a tooth-supported restoration, or a single-tooth implant. Selecting the appropriate option depends on the malocclusion, specific space requirements, tooth-size relationship, and size and shape of the canine. The ideal treatment is the most conservative option that satisfies individual esthetic and functional requirements (Kokich and Kinzer, 2005). In the present case, there were missing lateral incisors with multiple diastemas and both maxillary canines were lateralized which were collectively responsible for the unesthetic smile of the patient. Several treatment options were discussed with the patient. One interdisciplinary option was to orthodontically bring the maxillary canines in their correct position thereby correcting the diastemas between canines and first premolars as well as closing the diastema between the central incisors, eventually creating appropriate space for restoring missing lateral incisors by implant-supported prosthesis. This option was rejected by the patient because of implant surgery and long treatment time of orthodontics. Patient opted for the more conservative option of porcelain veneers. Finally, the diastemas were treated by porcelain veneers on both central incisors as well as both maxillary canines which were modified to look like lateral incisors. Buccally, the first maxillary premolars appeared as canines which did not seem to need any modification owing to achievement of acceptable esthetics by veneers on four teeth only. The ceramics have predictable, esthetic, and long-lasting results. The procedure was intended to be minimally invasive, therefore lithium disilicate ceramic veneers with thicknesses ranging from 0.3 to 0.5 mm were fabricated because they have relatively high wear resistance without compromising optical properties (Conrad and Seong, 2007). One of the most important advantages of bonded porcelain veneers is that they are extremely conservative in terms of tooth reduction. In the current case, only 0.5 mm reduction on the labial surface was done. This minimal reduction rarely, if ever, leads to pulpal involvement which is a major advantage. The highly glazed surface of the porcelain laminates prevents plaque accumulation, considered important to attain a healthy periodontal response. Excellent esthetics could also be achieved due to lifelike appearance of porcelain and scattering effect of the luting cement. However, porcelain laminates have their own limitations too. They should not be used when remaining enamel is inadequate to provide adequate retention. The amount of unsupported porcelain should be carefully evaluated in cases with a large diastema. The prognosis for veneers in bruxers is doubtful. Even, if the laminates fail in the long run, the conserved tooth can still be treated with a full crown restoration. Porcelain laminate veneers offer a predictable and successful treatment modality that preserves a maximum of sound tooth structure. An increased risk of failure is present only when veneers are partially bonded to dentin (Meijering and Roeters, 1998). This case report justified the choice of treatment using porcelain veneers because the patient was underconfident due to an unesthetic smile and demanded immediate results. The use of porcelain veneers enabled a conservative and esthetically successful dental rehabilitation treatment.

Conclusion

The recovery of function and smile esthetics of a patient having congenitally missing lateral incisors and multiple diastemas with ceramic veneers allows conservative preparations. The diagnostic wax up and gathering expectations of the patient is crucial. Careful treatment planning, proper selection of dental materials and quality communication with laboratory technician contributes to satisfactory esthetic results.

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