IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 5 Ver. II (May. 2015), PP 49-53
www.iosrjournals.org

Enhancing Smile with Laminate Veneers – A Case Report

Dr. Biji Kurien[1,] Dr. Gilsa K Vasunni[2,] Dr.Mohamed Saheer Kuruniyan[3,]
Dr. Bennett A Correya[4,] Dr. Vinni T K[5.]

[1,] *Junior Resident Department of Prosthodontics Govt. Dental College, Kozhikode , Kerala, India.*
[2,] *Professor and Head of the Department of prosthodontics, Govt. Dental College, Kozhikode, Kerala, India.*
[3,4.] *Assistant Professor Department of Prosthodontics Govt. Dental College, Kozhikode, Kerala. India.*
[5,] *Associate Professor Department of Prosthodontics Govt. Dental College, Kozhikode, Kerala, India.*

Abstract: *Porcelain laminate veneers have evolved over the last several decades to become one of the esthetic dentistry's most popular restorations. It is a conservative alternative to full coverage for improving the appearance of an anterior tooth. The development of new materials and techniques based on the principles of adhesive dentistry has improved the cosmetic aspect of dental restoration. Porcelain laminate veneers are one of the most conservative and esthetic restoration that can be used for enhancing esthetics. This article highlights the esthetic improvement of a young patient with enamel hypoplasia using porcelain laminate veneers.*
Keywords*: porcelain laminate veneers, feldspathic porcelain, glass ceramics.*

I. Introduction

A smile reflects a person's inner self. A sparkling smile in harmony with the lips and face crowns the beauty of the person's character. Each smile is unique to that person. The dentist's perception, talent, artistic flare and skills in listening to the specific desires of his patient, help to create a smile that suits the face and personality of each individual patient.

Laminate veneers have evolved over the last several decades to become one of the esthetic dentistry's most popular restorations. It is a conservative alternative to full coverage for improving the appearance of an anterior tooth. The use of adhesive technologies makes it possible to preserve as much tooth structure as is feasible while satisfying the patient's restorative needs and desires. With indirect restorations, clinicians should choose a material and technique that allows the most conservative treatment, which meets the aesthetic, and biological requirements of the patient and which has the mechanical requirements to provide clinical durability[1]. Based on their strength, longevity, conservative nature, biocompatibility, and aesthetics veneers have been considered one of the most viable treatment modalities since their introduction in 1983[2].

Ceramics are wear resistant, exhibit excellent color stability, and present a thermal coefficient of expansion similar to enamel. They also present a good chemical stability in the oral environment and are described as of one the most biocompatible, aesthetic, and least invasive modalities of treatment [3]. The clinical success of the technique can be attributed to great attention to detail in a set of procedures, which include treatment planning, conservative preparation of the teeth, proper selection of ceramics to use, proper selection of the materials and methods of cementation and proper planning of maintenance of this restorations [4].

II. Case Report

A twenty years old male patient reported to the Department of Prosthodontics, Govt. Dental College Kozhikode for esthetic improvement of his teeth. A detailed family history, medical history and dental history was obtained. In family history, none of his family members had similar problem. Medical history was also not relevant. The blood investigations done were in normal limits. Past dental history revealed that his primary teeth were not affected similarly. Extra oral examination could elicit no abnormal findings. Intraoral examination revealed generalized enamel hypoplasia which involved all the teeth(Fig 1,2, 3). The maxillary and mandibular incisors exhibited variable degrees of pitting with yellowish to brownish discoloration of the surface. White opaque spots on the surface of enamel of maxillary and mandibular incisors were also noted. All teeth were vital and had no hypersensitivity. An orthopantomogram was taken and revealed no abnormal findings. All teeth including the third molars have erupted and were in normal occlusal relation. No carious teeth were present. Generalized gingival inflammation was noted and on probing mild bleeding was found. Moderate amount of calculus was present. Treatment for oral hygiene improvement was done. Various treatment options were discussed which included laminate veneers, bleaching, composite veneering and microabrasion. Owing to its minimally invasive nature and excellent aesthetic qualities it was decided to enhance his appearance using porcelain laminate veneers. Maxillary and mandibular diagnostic casts were made.After analyzing the patient's smile line it was decided to place porcelain laminate veneers from canine to canine in both arches. Diagnostic wax up was done.(fig- 4).Depth orientation grooves were placed on the facial surface of the tooth with 0.3mm and 0.5mm three wheel diamond depth cutter on the gingival half and incisal half respectively. The tooth

structure remaining between the depth orientation grooves were removed with a round end tapered diamond. Doing so, the aprismatic top surface of mature unprepared enamel, which is known to offer only a minor retention capacity, was removed. A chamfer finish line was placed lightly subgingivally in the maxillary anterior teeth and at the same level as the gingival crest in the mandibular teeth. Distally the tooth preparation was extended into the contact area but terminated facial to the contact area.

An overlapped incisal edge preparation was chosen because incisal overlap provides a vertical stop that aids in the proper seating of the veneer. The lingual finish line was placed with a round end tapered diamond, approximately one fourth the way down the lingual surface connecting the two proximal finish lines. The finish line should be minimum 1mm away from centric contacts. The veneer extended onto the lingual surface will enhance mechanical retention and increase the surface area for bonding. All sharp angles of the preparation were rounded off (fig-5). A coat of dentin bonding agent (Adper single bond 3M ESPE USA) was applied to the prepared teeth surfaces immediately after preparation. After gingival retraction, (fig-6) impression was made with polyvinylsiloxane by putty-wash technique using light cured customized impression tray(Fig-7). The shade was selected under direct sunlight with VITA 3D master shade guide. Temporary restoration was done with light cured composite resin. It was bonded to the teeth only at 2 to 3 spots with composite resin.

2.1 Veneer cementation:

The temporary veneers were removed; the teeth were cleaned using pumice and was dried. The porcelain veneer made up of IPS-emax was tried on to the tooth with selected shade of try in paste to verify its color and fit (Fig-8,9). The esthetics and fit were acceptable, the veneers were removed from the tooth, rinsed thoroughly, and dried. The inner side of porcelain veneer was etched with 5% hydrofluoric acid (IPS Ceramic etching gel) for 20 seconds, washed under running water and dried. (Fig-10) A layer of silane coupling agent (Monoborid-S, Ivoclar vivadent) was applied on the inner surface of veneer and gently air dried after one minute. Fig-11)The silane coupling agent forms a chemical bond between the porcelain and resin, besides it also reduces the marginal leakage and discolouration[9] .The silanized surface was then coated with a thin layer of bonding agent thinned with air from the air syringe. The resin layer was polymerized with light. The prepared teeth were etched with 37% phosphoric acid for 30 seconds, rinsed thoroughly and dried. (Fig-12) A layer of bonding agent (Adper single bond 3M ESPE USA) was applied on to the tooth surface. A dual cure resin cement (Variolink II, Ivoclar vivadent, Liechtenstein) was used for bonding the veneer to the tooth.(Fig-13). The selected shade of base paste and catalyst paste were mixed in proportion to get the shade that was obtained during the try in stage, and a layer of cement was applied on the inner surface of veneers. The veneers were then positioned on the teeth correctly with slight pressure, the excess cement was removed with a brush. A coat of glycerine gel (Liquid strip- Ivoclar Vivadent) was applied along the veneer margins. (Fig-14) Light curing of the luting composite was done through the Liquid strip for 10 seconds and the veneers were tacked to the teeth. After the initial set the remaining excess cement was removed with a NO: 12 Bard-Parker blade. The polymerization was continued for 60 seconds by directing the light initially from lingual side, so that the resin cement shrinks towards tooth providing more retention. Then each segment of veneer was light cured for 40 seconds. Occlusion was checked to ensure that no contact existed on tooth-porcelain interfaces. The patient was satisfied with his new smile (Fig-15,16,17,18,)

III. Discussion

Tooth preparation - Concepts regarding the preparation of teeth for porcelain veneers have changed over a past few years. Early concepts were suggested minimal or no tooth preparation, but current beliefs support removal of varying amount of tooth structure.

To improve aesthetics in anterior teeth by means of laminate veneers, two types of materials are indicated for their translucency and potential to be used in small thickness: sintered feldspathic porcelain and pressable ceramic, which can be also, be used milled using a computer-aided manufacturing technique[5,6].

Four basic incisal preparations exist for full veneers

(a) The 'window' or intra-enamel preparation- Preparation terminates 1mm above the incisal edge
(b) The feathered incisal edge preparation -Preparation terminates at the facioincisal line angle
(c) The incisal bevel preparation-a buccopalatal bevel is placed at the incisal edge of the tooth
(d) The Overlapped incisal edge preparation-Veneer overlaps the incisal edge terminating on the lingual surface

Dentist should base their choice of material on the requirements of the tooth being restored, such as the indication and the necessary of the tooth preparation to improve aesthetics and function[7]. Glass ceramics may be ideally suited for uses as dental restorative materials. Their mechanical and physical properties have generally improved, including increased fracture resistance, improved thermal shock resistance, and resistance to erosion. Increased strength in glassy ceramics is achieved by adding appropriate fillers that are uniformly

dispersed throughout the glass, such as aluminum, magnesium, zirconica, leucite, and lithium disilicate[8].

The ceramics reinforced by lithium disilicate are true glass ceramics, with the crystal content increased to approximately70% and the crystal size refined to improve flexural strength[9,10].

These glass ceramics can be used in clinical situations when flexure risk factors are involved. With this material, the thickness must be more than 0.8mm, except at marginal areas. They can gradually thin to a margin of approximately 0.3mm[1,11]. Generally, feldspathic porcelain materials are indicated for anterior teeth when significant enamel is remaining. When deciding whether to use feldspathic veneers, it is also necessary to undertake a flexural risk assessment. Flexural risk tends to be higher when bonding to a higher extension of dentin, because dentin tends to be more flexible than enamel. In these higher-risk clinical situations, the glass ceramics should be considered. Their required major thickness for the restoration may compensate for this problem, since increased thickness results in the increasing of strength of this material[11].In the present case pressable glass ceramic (lithumdisilicate) was used.

The types of preparation differ only at the incisal region of the tooth. At the cervical third, the gingival margin of the veneer must be located at the same level as the gingival crest or lightly subgingival for the anterior teeth. In this region, it is difficult to obtain a preparation with suitable depth while preserving intact enamel; therefore, in this place, the wear must be approximaterly 0.3mm. At the middle third, the preparation may achieve 0.5-0.8mm[3,11]. At the incisal third, the preparation may be modified.

So to obtain adequate color properties at the incisal third of the laminate veneers, the preparation needs to allow a thickness of ceramic of 1.5-2.0mm, and this is possible with the "overlap" preparation. At the proximal region, the preparation must follow the papilla and extend until interproximal contact [11,12].

In cases of dentin exposition, sealing this structure with a dental bonding agent is suggested immediately after the completion of tooth preparation and before the final impression itself, because the newly prepared dentin is ideal for the adhesion. [5,12] This technique called, the "resin-coating technique" consists of interposing a layer of low viscosity resin between the dental substrate and the luting cement[12]. This procedure seems to produce an increase in the union strength and a reduction of crack formation, bacteria infiltrations, and postoperative sensitivity. A substantial clinical advantage is that this measure protects the pulpodentinal organ and prevents sensitivity and bacterial leakage during the provisional phase.

Effective etching of the ceramic surface is considered an essential step for the clinical success of indirect ceramic bonded restorations and direct ceramic repair procedures

The aim of pre-cementation surface modification of the porcelain is to increase the surface modification of the porcelain is to increase the surface modification of the surface area available for bonding and to create undercuts that increase the strength of the bond to the resin luting cement[13].

Due to the inherent brittle nature of ceramics, adhesive cementation is used to improve fracture resistance by penetrating flaws and irregularities on internal surfaces, minimizing crack propagation, and allowing a more effective stress transfer from the restorative to the supporting tooth structure[14]. For cementation of porcelain veneers, a light –curing luting composite is preferred. A major advantage of light –curing is that it allows for a longer working time compared with dual –cure or chemically curing materials[14].

In the case of porcelain with a thickness of more than 0.7mm, Light –cured resin composites do not reach their maximum hardness [15]. A dual-cured luting composite, which contains the initiation systems for both chemically and light –cured composites, is advisable in these situations. With these later luting agents, a stronger bond can be obtained with the porcelain. Furthermore, higher values of hardness were reported for the dual-cure resin cements than for the light –cured luting composites, because of their higher degree of polymerization [15] .Composites are subject to oxygen inhibition ie, the surface of the composite that is not covered with a matrix and comes in contact with oxygen during polymerization is not polymerized. If this layer is covered with glycerin gel which is impermeable to oxygen, it is protected from oxygen and thus helps in complete polymerization of the composite . But it has been reported that the dual cured laminate veneers shows the discoloration cervically due to leaching out of initiator. The advantages of porcelain laminate veneers are aesthetics, biocompatibility, effective colour change, inherent porcelain strength, resistance to fluid absorption. The various disadvantages are difficulty in colour matching, liability to fracture, sensitive bonding procedures, lack of reparability and high cost.

IV. Conclusion

Aesthetic enhancement of the anterior teeth of a young adult was successfully done with the help of laminate veneers made of ceramic reinforced by lithium disilicate. The patient was informed the important of maintenance of oral hygiene and was advised periodic follow up. The veneers are technique and material sensitive but if used with proper knowledge and skill, these restorations provide the best esthetic and functional outcome. The predictability of any restorative process will rest on the precise evaluation of oral and occlusal conditions.

References

[1]. McLaren EA, WhitemanYY. Ceramics: rationale for material selection. Compend Contin Edu Dentl. 2010:31(9):666- 668.
[2]. McLaren EA,LeStage B. Feldspathic veneers: what are their indications ? Compend Contin Edu Dent. 20ll;32(3):44-49.
[3]. Radz GM. Minimum thickness anterior porcelain restorations. Dent Clin.North Am. 20II;55(2):353-370.
[4]. Calamia JR, Calamia CS Porcelain laminate veneers: reasons for 25 years of success. Dent Clin N Am. 2007:51:399-417.
[5]. Donovan T. Factors essential for successful all-ceramic restorations. J Am Dent Assoc. 2008;Suppl I39:I4S-I8S.
[6]. Soares CJ. Soares PV, Pereira JC, Fonseca RB. Surface treatment protocols in the cementation process of ceramic and laboratory-composite restorations: a literature review J Esthet Rest Dent. 2005:17: 224-235.
[7]. Spear F. Holloway J. Which all-ceramic system is optimal for anterior for anterior esthetics? J Am Dent Assoc. 2008:Suppl 139: 19S-24S.
[8]. Guess PC, Schultheis S, Bonfante EA. Coelho PG. Ferencz J, Silva NRFA. All ceramic systems: laboratory and clinical performance. Dent Clin North. Am 2011:55(2):333-352.
[9]. Giordano R. McLaren EA. Ceramics overview: classification by microstructure and processing methods. Compend Cumin Educ: Dent. 20I0:31(9):682-684.
[10]. Kelly JR. Benett P Ceramic materials in dentistry: historical evolution
[11]. and current practice. Aust Dent Journal.2011 1;56 Suppl 1:84-96.
[12]. Della Bona A. Bonding to Ceramics. Scientific Evidences for Clinical Dentistry. Sao Paulo: Artes Medicas: 2009.
[13]. Magne P, Douglas WH. Design optimization and evolution of bondcd ceramics for the ;anterior dentition: a finite –element analysis Quintessence Int. 1999;30(10):661-672
[14]. Addison O, Marquis PM, Fleming GJP. Adhesive luting of all-ceramic restorations-the impact of cementation variables and short-term water storage on the strength of a feldspathic dental ceramic. JAdhes Dent. 2008;10:285-294.
[15]. Moraes RR, Correr- Sobrinho L, Sinhoreti MA., Puppin- Rontani RM, Ogliari F, Piva E, Light –activation of resin cement trough ceramic: relationship between irradiance intensity and bond strength to dentin, J Biomed Mat Res. 2008;85B:160-165.
[16]. Linden JJ. Swift EJ, Boyer DB, Davis BK. Photo-activation of resin cements through porcelain veneers. J Dental Res. 1991 ;70: 154-157.

FIGURES

Fig-1 preoperative frontal view

Fig-2 Preoperative right lateral view

Fig- 3 preoperative left lateral view

Fig- 4 Wax mock up

Fig- 5 Preparation

Fig- 6 Gingival Retraction

Fig- 7 Light cured customized tray

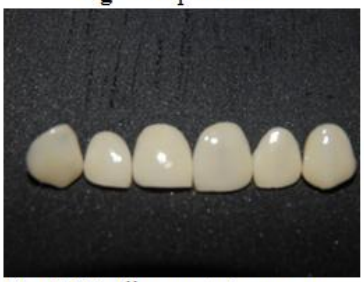

Fig- 8 Maxillary anterior veneers

Fig- 9 Mandibular anterior veneers

Fig-10 Etching using 10% Hydro Fluoric Acid

Fig-11 Silane application

Fig- 12 - 37% Phosphoric acid

Fig- 13 Resin cement

Fig- 13 Application of Liquid strip

Fig- 15 Post operative

Fig- 16 Post operative

Fig- 17 Postoperative

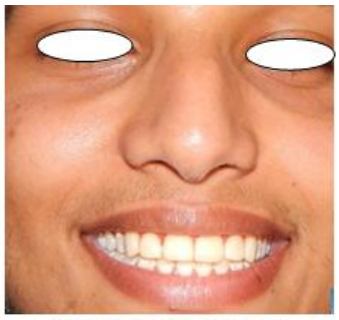

Fig- 18 Postoperative