International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Smile Makeover in a Patient with Severe Dental Fluorosis using Ceramic Laminate Veneers: A Case Report

Dr. Ankit Verma

Resident, Department of Prosthodontics , Dr.Z.A. Dental College, Aligarh Muslim University (AMU), Uttar Pradesh, India

Abstract: ***With increasing awareness and aesthetic concerns, the number of people seeking professional dental help for improvement in the appearance of their dentitions and for smile makeovers are on rise. Aesthetic veneers in ceramic materials offer great promise in this regard as they impart excellent aesthetic results in minimally invasive way and simultaneously meet the structural, biological and mechanical pre-requisites necessary to ensure long term clinical performance. Proper selection of the cases, a thorough knowledge of the techniques and materials involved in their fabrication as well as their correct applications are critical determinants of the success of ceramic laminate veneers. This case report describes the case of severe dental fluorosis causing brownish patchy discoloration of the teeth which was restored with porcelain laminate veneers to achieve the desired aesthetic outcome.***

Keywords: Porcelain laminates, Aesthetic veneers, Silane coupling agent, Glass Ceramics

1. Introduction

In today's aesthetic driven modern society, anterior teeth discolorations becomes a major source of concern in some individuals. Several factors have been linked with teeth discolorations which lead to unsightly smiles in such patients. Most of them are caused by extrinsic stains present in some foods and beverages while others result from intrinsic discolorations caused due to devitalisation of pulp, excessive fluoride intake during childhood, maternal use of tetracycline during pregnancy, use of tetracycline antibiotics in children under 8 yrs of age and trauma to the tooth bud during development. While in most cases, extrinsic stains can be removed with professional scaling, some require the use of bleaching agents. Still others, where stains do not respond to bleaching agents, the dentists may recommend covering the discoloured areas with veneers.

The use of ceramic laminate veneers to attend to the aesthetic demands of some patients have shown great promise ever since its introduction in 1938 by a Californian dentist Charles Leland Pincus[1].But their ability to impart great aesthetics was marred by their short longevity as in absence of appropriate cements, the procedure used to last only for few hours. However, with the development and the evolution of materials and techniques for adhesive cementation since 1980s, today porcelain laminate veneers have became one of the most predictable, most aesthetic and least invasive modalities of treatment[2].They also demonstrate excellent clinical performance in terms of strength, longevity, conservative nature and biocompatibity[3].

Aesthetic laminate veneers are manufactured from two different classes of ceramics – Feldspatic porcelains and Glass- ceramics. Feldspathic porcelains exhibit excellent aesthetics but poor mechanical properties. Flexural, tensile and shear strength are low and so such risk assessments are necessary when deciding on feldspathic porcelain veneers. A good bond, in combination with stiffer tooth substructure (enamel) is essential to reinforce such restorations[4]. Flexural risk tends to be higher when bonding to dentin, because dentin tends to be more flexible than enamel[5]. Similarly, tensile and shear stress risks are higher when there are large areas of unsupported porcelain[3]. Therefore, in such clinical situations, Glass- ceramics which have higher strength values should be considered. Leucite reinforced and lithium disilicate based Glass-ceramics are two such materials indicated for this purpose due to their good optical properties and amenability to acid etching procedures[6].
Clinical success of laminate veneers depends on both the suitable indications of the patients and the correct application of the materials and techniques available for that, in accordance with the necessity and the goals of the aesthetic treatment[5]. Their indications apart from teeth discolorations include non- aesthetic tooth shape or contour requiring morphologic modifications, diastema closure, minor tooth alignment , dental fluorosis with enamel mottling, minor chippings or fracture of teeth[7,8].The severity and the extension of these factors must be evaluated because they will determine the treatment goals which in turn will dictate the material choice and technique. More aggressive preparation may be necessary to achieve functional results in some cases and such cases would benefit more from glass based ceramic veneers rather than feldspathic porcelain veneer materials[5]. Contraindications to placement of veneers include patients with anterior deep bite, severe bruxism or other para-functional habit, presence of any soft tissue disease, severely malpositioned teeth and teeth with extensive existing restorations[2,9].

2. Case Report

21 yrs old male patient reported to the Department of Prosthodontics, Dr. Z.A. Dental College, AMU, Aligarh with complain of severe brownish discoloration of teeth of both upper and lower dental arches [Figure 1].

Figure 1: Pre-operative photograph of severely discoloured teeth

Complete history of the patient was recorded, pre-operative photographs were taken and diagnostic models were made. Patient's case history revealed that he was a native of Unnao district, Uttar Pradesh, a region from where high incidences of endemic dental and skeletal fluorosis have been reported[10]. This in addition to the clinical picture led to the diagnosis of dental fluorosis and the patient was convinced that eight porcelain laminate veneers involving the upper six anteriors and the upper first pre-molars on both sides can sort out his aesthetic concerns and can help restore a confident smile.

Diagnostic wax mock up was made [Figure 2] to establish the correct values and to ensure symmetry and proportion to the patient smile. Mock up revealed that tooth number 13 has to be planned for gingivectomy to increase the cervico-incisal length by 2mm. It was also revealed that tooth number 22 need 1mm increase in length incisally while tooth numberequire 0.5mm increase in length mesio-distally.

Figure 2: Diagnostic mock up

Shade selection was done prior to teeth preparation using Vita shade guide and the conventional Type II teeth preparation was planned covering the incisal edge (buccal cusp in case of premolar) and terminating lingually (occluso-bucally in case of premolar). Initially, a 0.5mm depth cutting bur was used to establish the depth orientation grooves . A chamfer diamond bur was used for buccal reduction and to establish the gingival and inter-proximal finishing lines. Ceramic coverage of incisal edge should have at least 1mm thickness. Little or no reduction is required when lengthening of the incisal edge is desired. Lingual reduction is carried out by holding the chamfer diamond bur parallel to the lingual surface up to a depth of 0.5mm [Figure 3].

Figure 3: Teeth preparation for ceramic laminate veneers

Following teeth preparation, full arch impressions were taken in polyvinyl siloxane impression material and the impressions were sent to lab along with the instructions regarding shade, desired dimensions (length, width, thickness) of individual teeth.

After receiving of the fabricated veneer restorations (IPS e.max Press) they were inspected first on model itself for shade, fit, marginal adaptation, appearance and translucency . Then each veneer is individually fitted in the patient and checked for marginal accuracy. Proper isolation methods were employed to maintain a dry contamination free field before final placement of the veneers. The prepared teeth surfaces were pumiced and rinsed and etched with 37% phosphoric acid gel (Total Etch, Ivoclar Vivadent) for 15 secs [Figure 4] followed by rinsing with spray and gentle drying.

Figure 4: Application of etchant gel

Bonding agent (Tetric N-Bond Universal,Ivoclar- Vivadent) is applied on the etched teeth surfaces using applicator tip and polymerized with a light curing unit for 20 seconds. The inner surface of the ceramic laminates is etched with

hydrofluoric acid containing gel (IPS Ceramic Etching Gel, Ivoclar Vivadent AG), rinsed thoroughly with water and air dried.

A silane coupling agent is applied to the etched surface (Monobond N, Ivoclar-Vivadent) and left to dry. After drying, a self adhesive resin cement (3M ESPE Relyx U200) is applied to the inner surface of the laminates and the laminates are positioned and gently pressed on to the teeth. The excess cement is removed and the resin cement is completely cured with light curing tip both labially and lingually. Carbide finishing burs are used to remove excess resin cement at the margins and final finishing was done with polishing cups and points.

The patient was satisfied with the aesthetic outcome of the treatment [Figure 5] and post treatment instructions and maintenance protocols were explained to the patient.

Figure 5: Pre- operative (left) and post-operative (right) smile of the patient

3. Discussion

The success of the ceramic veneers is greatly determined by the strength and the durability of the bond formed between the three different components of the bonded veneer complex: the tooth surface, the ceramic veneer and the luting composite[11]. The success of bonding to teeth in turn relies on suitable preparation and conditioning of the involved surfaces – the ceramics and the mineralized dental tissues[12]. One of the main objectives of tooth preparation is to maintain the entire contour in intact enamel whenever possible because the bond strength of ceramic bonded to enamel is superior when compared with the bond strength of ceramic bonded to dentin[6,13]. The enamel surface is conditioned with 37% phosphoric acid to increase the surface energy of the structure and enhance bonding. Etching of the ceramic surface with 9.5% HF for 2 to 2.5 minutes brings about alteration in ceramic surface topography and an increase in its adhesive potential. Application of silane coupling agent with bifunctional group provide a chemical link between the luting resin composite and ceramic. A silane group at one end chemically bonds to the hydrolyzed silicon dioxide at the ceramic surface and a methacrylate group at the other end copolymerizes with adhesive resin[5]. For cementation, a light cured luting composite is preferred as it provide longer working time compared with dual cured or chemically cured materials and also, their color stability is superior compared to dual cure or chemically cured materials[14].

Following the placement of restorations, the patient in instructed not to use alcohol containing drinks or mouthwashes for first 48 hours, avoid hard foods and extremes in temperature[15].It is also recommended to use soft brush with rounded bristles and floss, tooth paste with less abrasive content and soft acrylic mouth guard when involved in any form of contact sport[16].

References

[1] Pincus C.R., Building mouth personality. Journal of the California Dental Association, 1938:14; 125–129
[2] Radz GM, Minimum thickness anterior porcelain restorations. Dent Clin North Am. 2011;55(2):353-370
[3] Mc Laren EA, LeSage B.Feldspathic veneers:what are their indications? Compend Contin Educ Dent.2011;32(3)44-49
[4] Mc Laren EA, Whiteman YY. Ceramics: rationale for material selection. Compend Contin Educ Dent.2010;31(9)666-668
[5] Núbia Pavesi Pini, Flávio Henrique Baggio Aguiar, Débora Alves Nunes Leite Lima, José Roberto Lovadino, Raquel Sano Suga Terada, and Renata Corrêa Pascotto Advances in dental veneers: materials, applications, and technique. Clin Cosmet Investig Dent. 2012; 4: 9–16.
[6] Della Bona A. Bonding to Ceramics: Scientific Evidences for Clinical Dentistry. Sao Paulo:Artes Medicas;2009
[7] Belser UC, Magne P, Magne M. Ceramic laminate veneers: continuous evolution of indications. J Esthet Dent. 1997;9(4):197–207.

[8] Strassler HE. Minimally invasive porcelain veneers: indications for a conservative esthetic dentistry treatment modality. Gen Dent. 2007;55(7):686–694.
[9] Seydler B, Schimitter M. Esthetic restoration of maxillary incisors using CAD/CAM chairside technology – a case report. Quintessence Int. 2011;42:533–537.
[10] Tewari A, Dubey A. , Chaturvedi M.K. Assessment of exposure, intake and toxicity of fluoride from ground water resources. Rasayan J. Chem. 2012; 5(2);199-202
[11] Peumans B, Van Meerbeek B, Lambrechts P, Vanherle G. Porcelain veneers: a review of the literature. J Dent. 2000;28:163–177
[12] Della Bona A, Anusavice KJ. Microstructure, composition, and etching topography of dental ceramics. Int J Prosthodont. 2002;15(2):159–167.
[13] Calamia JR, Calamia CS. Porcelain laminate veneers: reasons for 25 years of success. Dent Clin N Am. 2007;51:399–417
[14] 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
[15] Sarver DM, Ackerman MB. Dynamic smile visualization and quantification: Part 2. Smile analysis and treatment strategies. Am J Orthod Dentofacial Orthop. 2003 Aug;124(2):116–27.
[16] Magne P, Belser U. Bonded porcelain restorations in the anterior dentition: a biomimetic approach. Quintessence Publishing Company; 2002.