

ESTHETIC REHABILITATION OF DISCOLOURED ANTERIORS BY CERAMIC VENEERS- A CASE REPORT.

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ABSTRACT:

Porcelain laminate veneers were first introduced by Charles Pinacus in 1930 s. Since then gained popularity in the field of esthetic dentistry because of the optimal esthetics, minimal preparation and durability. The advancement in dental adhesives also contributed the successes of ceramic laminates. This article highlights the improved esthetics of a patient who came with a complaint of discolored teeth, restoring them with ceramic veneers

KEYWORDS: Veneers, Discoloration, Luting, Esthetics, Adhesives

INTRODUCTION

The application of veneers to the teeth, using various techniques to correct the esthetic problems has been in dental practice for the past 20y ears. Increased patient demands for esthetics coupled with the desire by profession for conservative treatments have fueled the expansion of bonded porcelain. The many materials and techniques available in veneers can be divided into three categories¹

- 1) freehand- placed , direct composite resins;
- 2) Preformed acrylic laminates;
- 3) Laboratory- fabricated acrylic resins, micro fill composite resins,porcelains and glass ceramic veneers.

Clinical studies show that ceramic veneers are strong, durable and esthetically pleasing and do not adversely affects the periodontium. They have superior esthetics and color stability in the oral environment. Studies that followed ceramic veneers for up to 15 years reported total failures of only7%, equaling approximately a 1%chance of failure per year ². The main mode of failure with bonded porcelain is fracture and the bond failure, which are interrelated. Bonding mechanisms and materials have improved over years and in modern dentistry the bonding failure is minimized. Maintaining original anatomy, shape and contour is extremely important for optimal esthetics. Clinician should remove only slight to moderate amount of enamel during tooth preparations. Veneers are a popular treatment option for various reasons as it is a comfortable and simple procedure that take less visits. Veneers can be the treatment of choice in severely to less discolored anteriors, discolorations that can't be treated by procedures like bleaching, chipped or worn out teeth also

to correct uneven spaces and diastema etc., However the teeth must be healthy and free of decay and should have fair periodontal health. Also the patients with bruxism where there is bite interference or habits like clenching, chewing hard objects like pencil ice etc., may not be the ideal choice for veneers. Clinician should keep in mind to keep the preparation in enamel itself as some studies showed debonding of veneers when it's placed deep into the dentine over the period of service.

Case report

A 22 year old male patient reported to the Department of Conservative Dentistry, G Pulla Reddy Dental College Kurnool with a chief complaint of discoloration of his teeth since childhood (**Fig.1**). Routine clinical examination has been conducted and vitality test for anterior teeth has been carried out. Patient presented with moderate fluorosis, and varies treatment modalities have been discussed with the patient. Ceramic veneers have been chosen. Study models and preoperative photographs were made. Shade selection was discussed since all upper and lower anteriors were involved for the treatment. Minimal preparation was carried out initially in the upper anteriors and after completing upper anteriors, treatment for lower anteriors has been carried out (**Fig.2**). Tooth preparation has been carried out with overlapped incisal edge preparation, terminating in lingual surface, rubber base impressions has been made after gingival retraction (**Fig.3**). Temporization has been done with acrylic (**Fig.4**). casts were prperaed by die cutting (**Fig. 5 and Fig.6**). In the next appointment the veneers has been luted. (**Fig.7a and Fig.7b**)



Fig.1 Pre Operative photograph



Fig.2 Tooth preparation



Fig.3 Retraction cord placed



Fig.4 Temporization

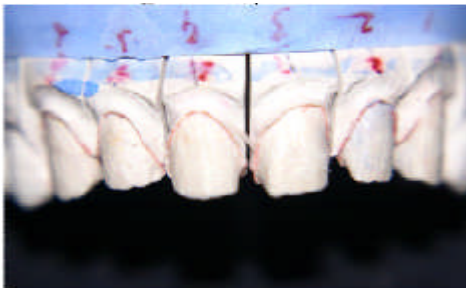


Fig. 5 cast showing labial preparation



Fig. 6 Cast Showing Lingual preparation



Fig.7a. Final restoration



Fig. 7b. Final restoration(closer view)

Discussion

The first ceramic veneers were fabricated from feldspathic porcelain³. With the launch of IPS Empress 15 years ago, pressed ceramics became the most popular technique for fabricating veneers. The advantages of pressed ceramics are 1) wear compatibility 2) increased translucency 3) stronger than feldspathic (IPS Empress 120 MPa compared to 60MPa to 110MPa feldspathic). Feldspathic ceramics also has advantages like masking out darker preparations, more 3D appearance in thinner areas, ability to use same ceramic as in adjacent PFMs, ability to place different opacity level within the restoration and also less tooth structure removal. Pressed ceramic selections are recommended in patients where there is a significant malposition that exists in the arch. It's also recommended where increase in tooth length is desired and also where the strength is of utmost importance. Recommendations for feldspathic ceramic selections are when there is a minimal preparation in size, shape and shade, and also in situations like diastema closures when shade is not altered significantly, in minimal malposition within the arch, in cases where adjacent teeth have PFM restorations placed.

Preparation guidelines for porcelain veneers:

Preparations are always dictated 3- dimensionally by how the final restoration is placed within the frame of the face, lips and gingival. This is determined by smile design with patient input and needs to be verified functionally^{3,4}; generally a veneer requires a minimum of 0.2mm (ideally) to 0.3 mm of thickness for each shade change. For example, to go from A3 to A0 requires would need a minimum of 0.6 (ideally) 0.9mm thick veneer. Less than 0.3mm veneers are difficult to fabricate and studies had shown that cracking occurred in some cases while cementation procedure. Depth orientation grooves are placed on facial surface of the tooth on the gingival third and incisal third which represents' as a guide line and the tooth structure between those grooves are removed by a safe end tapered bur. A chamfer finish line is preferred and placed as per the requirement of the final restoration. There are four basic incisal preparations that exist in veneers. (a) The window or intraenamel preparation which terminates 1mm above the incisal edge. (b) The feathered incisal edge preparation that terminates at the facio incisal line angle. (c) the incisal bevel preparation where a bucco palatal bevel is placed at the incisal edge. (D) The overlapped incisal edge preparation where the incisal preparation terminates on the lingual surface. However the overlapped incisal edge preparation is preferred as it provides a vertical stop that aids improper placement of veneers. Selecting luting cement is very important as it plays a major role in the longevity and esthetics of the ceramic veneers. Composite resin cements are preferred to lute the veneers due to various reasons. Resin cements are composed of the same basic components as

composite restorative material, but with lower concentrations of filler particles (50% to 70% by weight with glass or silica). Resin cements can be polymerized by light, chemicals, or a combination of both. Light activated resins should be utilized with indirect ceramic or composite restorations that are less than 1.5mm in thickness. The dual activated resins should be utilized when light penetration is limited to 1.5mm to 2.5mm restorative thickness (porcelain, composite veneers etc). Chemically activated resins can be used for cementing non light –transmitting restorations (all ceramic restorations, resin-bonded fixed partial dentures, ceramic or composite inlays/onlays etc..). Resin luting cements possess high compressive strength, increases the fracture resistance of ceramic materials that can be etched and silanated, and resist tensile fatigue. They have the potential for shade matching; the ability to adhere to multiple substrates, and demonstrate increased retentive capabilities, low solubility, improved marginal wear resistance and less micro leakage in comparison to other luting systems. However they have short working time, greater film thickness and post cementation sensitivity from polymerization shrinkage. They do not possess any anticariogenic effects and require more complicated clinical procedures which are technique sensitive. A number of research papers have demonstrated that over a period of time, noticeable colour changes in veneers luted with dual cure cements. This can be as a result of the tendency of aromatic tertiary amine co initiators used in the curing process to readily oxidize to form colored oxidized products. (Berrong 1993). Colour changes can be measured using Delta index and a Delta index of less than 3 is not detectable by human eye (Alexander 2004). In newer resin cements steps are taken to keep the delta index less than 3. Another potential source of colour change within the luting cement is HEMA (used to provide more hydrophilic properties to the resin). HEMA also makes the resin more prone to water sorption leading to a reduction in cross linking of the cure subsequently weakens the cement. In recent years non- HEMA luting resins regaining popularity.

Lutings of veneers involve 5 important steps^{5,6,7}. Step 1 is the try- in step. The veneers are extremely fragile and need to be handled with great care. The veneers must be first checked to ensure the fit, contour, shade and over all esthetics in stone model or cast. As veneers are fragile, this procedure can be carried out over a sink full of water so that even if it accidentally falls, may not result in fracture. Powder free gloves should be used to prevent the contamination of the fitting surface and hence affecting the final bond. After checking the veneer in the model, it should be evaluated on the prepared teeth prior to bonding. The prepared teeth surface should be carefully checked and verified that no residue of acrylic or composite material which is used for temporization remains attached to teeth surface. Veneers are first of all tried in on the prepared teeth by using a water soluble try-

in paste. Especially in preparations, where the proximal contacts have been breached wedges are required for teeth separation to allow full seating of the veneer. Use of thin articulating paper placed interproximally provides a guide to where the adjustment of any heavy contacts is required. Extensive modification if at all required should be send back to the laboratory for final finishing.

The fitting surface of the veneer should be etched by 10% hydrofluoric acid for one minute followed by cleansing in 95%alcohol for four minutes in an ultrasonic bath. This procedure can be carried out in laboratory or at the chair side by the clinician himself.

Once the try in is completed, and the cement shade is chosen the fitting surface should be cleaned to ensure optimal bond strength. Various methods have been suggested to remove the try-in paste, contamination with die stone, saliva etc. Acetone is one of the most widely recommended agents for cleaning the fitting surface of the veneer(Swift 1995, DELLA BONA 1994). Treatment with 37% phosphoric acid has been shown to restore the bond strength of veneers contaminated by saliva(Nicholls1998, Aboush 1998).^{8,9} Following the try-in and cleaning, two parts of silane is mixed and painted on the fitting surface of the veneer. This step should be carefully done as the chemical reaction that takes place between porcelain surface and silane agent are responsible for higher shear bond strengths found inporcelain/resin/tooth complex.¹⁰ The activation of silane agent starts when it is mixed with water. The hydrolysis results in the formation of silanol whichsubsequently reacts with silanol on surface of porcelain (Solderholm1993). Once applied, the silane must be left for sixty seconds to dry, thus removing excess absorbed water. Mixed silane should be used immediately as within several hours, it will polymerize to an unreactive and ineffective polysiloxane(Suh 1991). Two part silane are always preferred because of their longer shelf life than single-component silanes. In single –component silanes, it has been found that there is a rapid solvent evaporation there by lower shelf life. The prepared tooth should be thoroughly cleaned prior to etching. Pumice slurry is widely used even though there is some apprehension about the possibility of pumice remaining in the dentinal tubules leading to reduced bond strength. Again acetone is increasingly being used to clean the tooth surface. However prophylaxis paste that contains fluoride is contraindicated as it may compromise in bond strength. For many years the so-called “total etch”which includes the etching of enamel and dentine with phosphoric acid. This creates micromechanical retention of resin tags which has been universally accepted. More recently “self etch” systems are gaining popularity due to their definite advantages. This system use weak acids, which do not require washing of tooth surface after acid application and which leave smear layer on dentine. Self etch systems produce much less post operative- sensitivity when compared to total-etch procedures. Self-etch dental adhesive systems could contribute to the elimination of

residual bacteria and hence reduce the risk of secondary caries (Feuerstein 2007)².

CONCLUSION

Veneering teeth with ceramic has become a major part of esthetic dentistry. It gives the clinician to achieve optimal esthetics and desired results. Ceramic veneers have the potential for maintaining color stability in oral environment and do not adversely affect periodontium .its strong and durable and require less visits and a conservative procedure. In spite of their phenomenal success, they offer numerous challenges especially in luting procedures where multiple veneers has to be looted.

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