

Smile Rejuvenation in Dental Fluorosis and Midline Diastema using Porcelain Laminate Veneers– A Case Report

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ABSTRACT

A smile is a person's ability to express a range of emotions with the structure and movement of the teeth and lips and can often determine how well a person functions in society. In social interactions, our attention focuses mainly on the mouth and eyes of the face of the person speaking. As the role of porcelain veneers expands, dentists increasingly find themselves balancing esthetic advantages against material limitations. (1,2) Porcelain laminate restorations are one of the most successful treatment modalities for cosmetic improvement of unsightly anterior teeth. The treatment of traumatic fractures, moderate tooth wear, and congenital tooth malformations as well as the esthetic reshaping of anterior teeth and elimination of diastemas may also be accomplished with the use of these restorations. In comparison to composite resin laminate restorations, porcelain laminate restoration can mimic the natural translucency of enamel and reduce the risk of incisal chipping while providing an improved color stability in the long run. (3-8). The present case report describes the treatment of fluorosis and midline diastema with laminate veneers, to restore esthetics and function.

INTRODUCTION:

Esthetics is a primary consideration for patients seeking dental treatment (9). When the terms "esthetic" and "unaesthetic" are used, the connotation is that something is seen which is pleasant or unpleasant. Whether the viewer's perception of a visual experience is pleasant or unpleasant may be conditioned to some extent by cultural factors, and what is considered 'beautiful' in one culture may be "ugly" in another (10). The development of new dental materials and techniques has led to a greater number of treatment options that maximize the likelihood of an attractive outcome (9).

As the mouth is the center of communication of the face, the esthetic appearance of the oral region during smiling is a conspicuous part of facial attractiveness (11). The smile design theory can be broken down into four parts: facial esthetics, gingival esthetics, micro esthetics, and macroesthetics. Facial esthetics involves the lips and soft tissue curvature during smiling, speech,

and laughter. Gingival esthetics involves the health of the gingiva, the shape of the interdental papilla, and the presence or absence of black triangles. Micro esthetic features involve the anatomy of the anterior teeth, incisal translucency, characterization, and lobe development. Macro esthetic features involve the facial midline, as well as the size and shape of the teeth (12). The size and form of the maxillary anterior teeth are important factors in dental and facial esthetics. The goal of dental techniques is to have the maxillary anterior teeth restore optimal dentolabial relations in harmony with the overall facial appearance. The most influential factors contributing to a harmonious anterior dentition are the size, shape, and arrangement of the maxillary anterior teeth as viewed from the front (9).

INDICATIONS

The first important parameter for long term success of porcelain veneer is case selection. [13] The prime requirements in case selection are a high standard of oral hygiene and health and

presence of an adequate area of sound enamel available for etching. Among the main reasons for placing veneer are:

- correction of unaesthetic surface defects such as hypoplastic enamel or enamel lost by erosion[5,6] or abrasion
- masking of discoloration resulting from trauma
- endodontic treatment
- tetracycline stains
- repair of structural deficiencies such as fractured incisal edge,[13] diastema[14] and peg laterals.

CONTRAINDICATIONS

A decreased success[8] is seen when porcelain veneer is restored in teeth:

- With inadequate enamel and tooth structure such as amelogenesis and dentinogenesis imperfecta
- When there is existing large restoration or root canal treated teeth with less tooth structure
- Patient with oral habit[15] causing excessive stress on restoration and excessive interdental spacing.

A CASE REPORT:

A young patient aged 25 years old, reported to the Department of Prosthodontic, Crown and Bridge of Vidarbha Youth Welfare Society's Dental College and Hospital, Amravati. Intraoral examination revealed fluoride stains in the anterior region and Midline diastema (Fig.1)



Fig 1: Fluoride stains

Preliminary impressions were made and diagnostic cast was obtained. Mock-up were done (Fig.2).Silicone index was made on the mocked cast (Fig3).



Fig.2



Fig.3

SEQUENCE OF TOOTH PREPARATION

LABIAL SURFACE REDUCTION

In-vitro tooth preparation analysis has shown that the cervical portion is usually over prepared with dentin being exposed and the mid-incisal portion is usually underprepared. This finding confirms that careful depth control is necessary. Many different designs of depth -control cutting diamond are marketed exclusively for veneer preparation. The key to the success is the placement of the cutting instrument in two to three different planes along the convex labial surface. Three horizontal surface depth cuts are prepared on the labial surface with three tiered depth cutting diamond .Using the depth cuts as guide, labial surface is prepared to prevent over reduction (0.3-0.5 mm). Pencil lines can be marked into the enamel guide grooves. For the standard preparation, chamfer is placed at the height of gingival crest unless severe discoloration mandates a subgingival margin to gain extra veneer thickness. More success rate was seen with supragingival finish line because it:

- Increases the area of enamel
- Moisture control is better
- Visual confirmation is excellent
- Accessibility is good
- Maintenance of hygiene is better.

PROXIMAL REDUCTION

The preparation will be extended lingually only if diastema or peg lateral incisor has to be restored.[16] As much as possible the contact area should be preserved because its

- Extremely difficult to reproduce

- Simplifies the try-in
- Bonding is easy
- Saves clinical time and
- Provides better access.

INCISAL REDUCTION

There is no consensus on whether the incisal edge of the tooth should be included in preparation for porcelain veneers.[17] In the opinion of some authors incisal coverage is necessary in all cases to enhance the mechanical resistance of veneer, even though this involve the removal of 0.5-2.0 mm of intact incisal edge and may place the vulnerable cavosurface margin in an area of opposing tooth contact.[17] Other authors have suggested incorporating the incisal edge into the preparation only when dictated by esthetic or occlusal requirement.[18]

Huiet *al.* concluded from an *in vitro* study that porcelain veneer fabricated to three different design, demonstrated that the window type of preparation was strongest compared with an overlapping and feathered design.[19]

GINGIVAL DISPLACEMENT AND

IMPRESSION TECHNIQUE

Gingival retraction is usually needed for maxillary teeth and dark teeth. Apical infiltration over the teeth with the local anesthetic solution is also advised. However, care must be taken to prevent a subsequent gingival recession. A single cord is used which remains in place when impression is being made and no extra hemostatic agent in the cord is needed because bleeding should be minimal with healthy gingivae.(Fig4)



Fig.4

Impression technique: Any recognized elastomeric impression material is suitable for recording the preparation. If the preparation is limited to maxillary anterior teeth, an anterior stock tray is adequate. However, an alginate impression is suggested prior to preparation so that the custom tray is fabricated. A special tray is extended 5 mm gingival from gingival margin and cover half of palatal surface, adjacent unprepared teeth, and occlusal stop. When lower anterior teeth are prepared, it is necessary to have a custom tray of entire mandibular arch(17-20)

PROVISIONAL RESTORATION

Patients seldom experience sensitivity as a result of the preparation of enamel and are usually not unhappy about the appearance, in which case temporary cover may be omitted. But, if temporary restoration is needed then the materials used are preformed acrylic resin veneer and composite resin. Temporary veneer under functional stress may be “spot welded” for better retention.[16](Fig. 5)



Fig.5

LABORATORY PROCEDURES

Good communication with the laboratory with laboratory prescription, pre-treatment models, photographs of the teeth, and accurate impressions should be done. Laboratory fabrication techniques include(21)

- Platinum foil technique
- Refractory die technique and
- Computer-aided design-computer-aided manufacturing milling.

Hydrofluoric acid is applied to the fitting surface after fabrication, which provides bonding strength by partly dissolving the glassy matrix of the porcelain. Foggy appearance is noted for the proper itching and the etched veneers are not placed back on the master cast to avoid contamination and not to compromise with the bonding strength.[21]

VENEER TRY-IN

Major three steps in try-in procedure include:

- Dry try-in for marginal fit, where a retraction cord is placed to prevent the sulcular moisture or bleeding and each veneer is tried on the dry tooth surface for the marginal accuracy.
- Wet try-in for proximal fit, where the itched surface with water-soluble glycerin to minimize the vertical dislodgement is tried with all the teeth together for the assessment of proximal fit.
- Resin cement try-in done for color matching where if the color is acceptable cementation goes smoothly. If the veneers are lighter than that of intended shade, resin cement that is darker or approximately same degree is recommended. If it is darker than the intended shade, one part of light opaque resin cement and 10 parts of light translucent resin cement are recommended.

CEMENTATION

After one week the patient returned for placement of the final veneers and a try-in was carried out. The teeth were cleaned with pumice and dried and a transparent try-in paste was applied on the intaglio surface (Variolink try-in paste, Ivoclar). The marginal adaptation was checked with a probe using dental loupes (OrascopicHiRes3.3xmagnification). An adhesive cementation was performed: the dental enamel surface and the inner veneer surfaces were treated before luting. The first one was etched with 38%phosphoric acid for 30 seconds(Fig.4), washed for 60 seconds, and gently dried ;then a universal dental adhesive(Scotchbond Universal, 3MESPE) was applied using a microbrush. The

inner surface of the sectional veneers was etched with hydrofluoric acid(Fig.6).A silane coupling agent(ESPE-Sil, 3M ESPE) was used to facilitate the creation of high bond strength to the cement(Fig8). A coat of adhesive was applied to the inner surface of the restorations and left uncured. A thin layer of preheated resin composite material was used as the luting agent (Miris 2, Colt`ene Whaledent) and directly applied to the inner surface of veneers. Restorations were slowly seated on their respective teeth preparations; pressure was applied in order to facilitate adaptation and flow of the luting agent. While handling the veneers in place, excess resin cement was carefully removed using a sickle shaped scaler (Novatech cement remover, Hu-Friedy Co., Chicago, USA). Glycerine gel was applied at the margins to prevent an oxygen inhibition layer at the interface; subsequently a prolonged light curing was performed at facial, incisal, and palatal sides for 90 seconds each (Bluephase LED curing light, Ivoclar).The entire cementation procedure was performed in two steps: first on central incisors and then repeated on laterals. Following photo polymerization, residual remnants of cement were removed with the help of a number12 surgical blade and a dental probe; flossing was performed at the interproximal areas to confirm patency at the contact points. Margins were finished and polished with diamond burs, rubber points, and diamond polishing paste.(Fig.9) Patient should be advised to avoid highly colored foods, tea or coffee, hard foods, and extreme temperature for another 72–96 h.[22-24]



Fig.6



Fig7 (a)



Fig.7(b)



Fig.8



Fig.9 (a)



Fig.9(b)



Fig.9 (c)



Fig.9 (d)

MAINTENANCE

Success of any restoration depends on how the patient maintains it. Maintenance on the other hand should be a combined effort of dentist as well as the patient. Patient should be motivated:

- To avoid ultrasonic scaling and to undergo routine hand scaling.
- Abrasives and highly fluoridated toothpastes should be avoided.
- Excessive biting forces and nail biting and other habits should be under control.
- Soft acrylic mouth guards can be used during contact sports.[25,26]

RECENT ADVANCES

Lumineers that are made from a special patented Cerinate porcelain that is very strong but much thinner than traditional laboratory fabricated veneers are currently in trend. The thickness is comparable to contact lenses. Lumineers are a reversible procedure and it hardly requires removal of tooth structure. They will bond directly to the tooth making the bond very strong and the longevity is more as up to 20 years.[27] However, after all the treatment is confined to ideal patients.

DISCUSSION:-

The facial expression is the most common aspect of non- verbal communication and any deformity or unappealing feature that greets the observer's eye is bound to influence and perhaps bias, the messages that are received. Porcelain veneers are a recent and very exciting development in the dental armamentarium. They enable the dentist to

change the appearance, size, color, spacing, and to a minor extent, the positioning of the teeth. Our aim has to be less reduction of tooth structure and greater esthetics and durability. Patient selection is integral for success of PLVs, in the present case because of young age a conservative method of treatment PLVs were selected. Presence of normal overjet and overbite with favorable smile line and absence of parafunction and presence of sufficient enamel made PLVs most acceptable treatment option²⁸.

Dental fluorosis becomes a cosmetic concern particularly if it affects the anterior teeth. Although the causes and characteristics of dental fluorosis have been widely reported, fewer studies have discussed the proper treatment of fluorosed teeth. The selection of an appropriate treatment plan depends on the severity of fluorosis. Bleaching and microabrasion have been recommended for treating mild cases of fluorosis; however, in moderate to severe cases, bleaching and microabrasion are either ineffective or may lead to only transient improvement, while composite restorations are prone to discoloration, chipping, and debonding. Ceramic veneers are the restoration of choice for moderate to severe cases of fluorosis given their color maintainability, wear resistance, and biocompatibility. Ceramic veneers can completely mask the discolored tooth with minimal reduction of sound tooth substance because they require a minimally invasive design preparation. In addition, advances in ceramic materials have facilitated this process. Ceramic veneers provide both predictable and long-lasting aesthetic rehabilitation²⁹.

CONCLUSION:-

When nature's rules are followed and are combined with the advantages of modern science, miracles can happen. And the greatest miracles in life are when lives change, confidence is restored, and people become naturally attracted to you because of how you feel about yourself. Porcelain veneers are useful adjuncts to dentists' armamentaria; they help in the management of esthetic problems, minimizing dental tissue reduction. 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 oralandocclusal conditions³⁰.

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