INTRODUCTION

Porcelain veneers are increasing in present esthetic dental treatment because it is one of the conservative restorations of unaesthetic anterior teeth. Although this technique was first described in 1940 by Dr. Charles Pincus, developments in composite resin technology and acid etching of enamel and ceramic were required for it to become widely recognized.[1-3] Unfortunately, composite resins shows polymerization shrinkage, thermal dimensional changes, staining and poor wear resistance and used as veneers, have limited life of 4 years or less. The acrylic laminates veneer was an attempt to overcome some of the problems, but the long-term results were clinically unacceptable. Recent clinical studies have shown very good long-term result following the placement of anterior porcelain veneer. In one 5-year study, 83% were satisfactory, while in 8-year study, 95-97% were successful. However, the placement of porcelain is an irreversible procedure because of necessity for tooth preparation. Therefore, the criteria for porcelain veneer must be carefully reviewed before the procedure is undertaken for its long-term success.

The purpose of this article is to review the current literature and to present the important parameters such as inclusion and exclusion criteria, shade selection, tooth preparation, veneer placement (cementation), patient maintenance for determining long-term success of porcelain veneers.

METHOD FOR DATA COLLECTION

The literature source of present paper are published articles, internet sources, manuals, and textbooks reference in relevant papers and peer review articles, involving porcelain veneer by reviewers. The search terms used were broad so as to ensure the relevant studies were not missed, the search terms used were, porcelain veneers, veneers in dentistry, Esthetics, enamel bonding. Academic colleagues were also contacted to identify relevant research. The search duration was for 3 months between October 2014 and December 2014. Total of 150 articles were identified through search strategy, and 22 articles met the inclusion criteria and they were included in the review. The inclusion criterion were, articles which were in English language, full-text articles, articles with online accessibility, both review and case studies related to porcelain veneers. Articles with only abstracts and incomplete information and articles with veneers used for non-dental reasons were excluded.

CASE SELECTION

Indications

The first important parameter for long term success of porcelain veneer is case selection.[4] The prime requirements in case

ABSTRACT

Veneer is one of the most revolutionary techniques developed over the past 25 years. When dental professionals realized that porcelain can bond onto the composite and therefore onto the tooth surface, it changed everyone’s view. An attractive appearance with veneer has shown to increase people’s self-confidence, personal relationship, and even the success in his or her career. Hence with veneer, it is possible to create amazing esthetic results and yet retain considerable solid tooth structure. Successful result depends not only on the clinical and laboratory technique used for veneer fabrication, but also on an understanding of scientific background of the procedure involved since the placement of porcelain is an irreversible procedure it requires conservative tooth preparation. Therefore, the criteria for porcelain veneer must be carefully reviewed before the procedure is undertaken for its long term success. The purpose of this article is to present the most important parameters such as inclusion and exclusion criteria, shade selection, tooth preparation, veneer placement (cementation), patient maintenance for determining long-term success of porcelain veneers.

Key words: Enamel bonding, esthetics, porcelain veneer

Esthetics with Veneers: A Review

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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 or abrasion
- masking of discoloration resulting from trauma
- endodontic treatment
- tetracycline stains
- repair of structural deficiencies such as fractured incisal edge, diastema and peg laterals.

CONTRAINDICATIONS

A decreased success 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 causing excessive stress on restoration and excessive interdental spacing.

SHADE SELECTION PROCEDURE

The next important clinical parameter for the long term success of porcelain veneer is shade selection procedure. Proper shade selection is not only with matching the shade using shade guide, but involves various technique with proper lighting. Some of the tips for shade selections are:

- Shade matching must be carried out in early hours of appointment to avoid color fatigue
- If patient is wearing bright color clothing, drape in Neutral colored cover, have patient remove lipstick and other makeup
- Clean the teeth and remove all stains and debris
- Have patient’s mouth at dentist’s eye level
- Shade comparisons should be performed at 5 s interval so as to not to fatigue eyes
- Use canine as reference
- Grind off the neck of the shade tabs because it is darker than rest of tab
- If there is confusion between two shades then it is always better to select a shade of lower chroma and higher value.

PRELIMINARY TOOTH MODIFICATION

Before starting preparation and after establishing the desired shade the preexisting restoration and defect should be corrected and the anomalies contoured.

TOOTH PREPARATION

Why We Need Preparation?

Shaini et al. reported that 90% of the restorations placed in their patients were on unprepared teeth and concluded that this could have been responsible for low success rate in their study. Hence, preparation is needed mainly to

- Get definite finish line
- Provide space
- Get fluoride-rich layer
- Rough surface for better retention.

Today most authors agree on the importance of tooth preparation to achieve long term success. Conservative intra enamel preparation with facial reduction of enamel by 0.3-0.5 mm and finish line placed at or close to the gingival margin are recommended. Tooth preparation should not include any sharp internal angle, especially at the incisal edge where the stress will be greatest, it should allow for a path of insertion of the veneer which is free from undercuts.

CLINICAL STEP

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. 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. In the opinion of some authors incisal coverage is necessary in all cases to enhance the mechanical resistance of veneer, even though this involves 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. Other authors have suggested incorporating the incisal edge into the preparation only when dictated by esthetic or occlusal requirements.

Hui et 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.

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.

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.
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.[10]

LABORATORY PROCEDURE

Today four groups of ceramics are used for veneer: Feldspathic porcelain, cast or pressed porcelain, heat-pressed and CAD-CAM. Porcelain made of baked feldspathic porcelain allow a minimal veneer thickness of 0.3 mm which means that the amount of tooth substance that has to be removed for preparation can be kept to a minimum. However, feldspathic porcelain are brittle, and the sintering of porcelain particles creates microporosites which results in low flexural strength. Castable glass-ceramics and heat-pressed leucite reinforced ceramic offer greater flexural strength when the veneer thickness is not <0.5 mm. Therefore, the preparation must be 0.6-0.8 mm thick which conflict with the conservative nature of the restoration.[11,12]

TRY IN

The veneers are fragile and should be handled with care, preferably with the finger and over a color constrating surface such as a dark paper napkin. Inspect veneer for any crack and imperfection on the model for appropriate fit, then remove provisional with a hemostat, break the brittle composite used for luting the temporary restoration, and pumice all areas of prepared surface.[15] Moisten the teeth and internal surface of porcelain with water and place on teeth and evaluate fit and color. Adjustment are made with fine diamond bur and verified.

Special effect such as check lines, white hypoplastic patches and translucent incisal edges are normally incorporated into the porcelain during build up in laboratory, but some slight staining modification may be made at the chairside, as further firing of porcelain is not possible. There are a number of staining kits, mainly in the form of lightly filled resins, which include coloring.

BONDING PROCEDURE

There are 3 basic ways of attaching porcelain laminates to the surface of teeth.

- Chemical attachment: Cements (light activated composite and coupling agent)
- Micromechanical attachment: Acid etching
- Combined attachments.

Recently, Dune and Millar reported that the clinical longevity of ceramic veneer is more related to marginal adaptation.[16,17] Hence, cementation (bond between tooth and porcelain) is one of the most important parameter for success.[18]

Procedure: The teeth are isolated with cotton, lightly repolished, and washed. The selected tooth is separated from its neighbors with mylar strips, etched for 60 s, washed, and dried. Light-cure bonding agent is applied to etched enamel and excess blown off. The selected shade of cement is placed evenly on the porcelain to cover the whole fitting surface without trapping air. A 10 s spot cure of the cement labio-incisaly, after the veneer has properly positioned, permits removal of the unset excess elsewhere before final curing.

On completion of placement excess cured cement is removed with fine, water-cooled diamond and interproximal clearances confirmed with fine separating strips.

Excessive stress on newly placed veneer should be avoided as it takes 24 h for the coupling agent to develop its maximum bond strength. Final polishing is much better delayed to later visit.

Materdomini has reported that porcelain veneer esthetics can be enhanced with the contact lens effect concept.[19] Concept: When the veneer is cemented to tooth structure, it blends optically with the substrate, becoming difficult to detect. To achieve this effect; two elements must be controlled. The first: Translucency/opacity of luting composite. The second, translucency/opacity of luting composite. If either element results in high opacity level, especially at the margin, the contact lens effect will not be achieved.

PATIENT MAINTENANCE

The teeth should be professionally cleaned 3-4 times yearly. Hygienist should be warned not to use ultrasonic scaling or air abrasive. These procedures will prolong the life of veneers.[20]

FAILURES

The survival probability of porcelain veneers according to the Kaplan - Meier survival estimation method was 97% at 5 years and 91% at 10½ years.[21,22]

The failure rate significantly increased when the finish line crossed an existing filling, while no influence was found for the type of preparation of incisal edge, the location of gingival preparation margin, or the amount of time the veneer was in use.

In another study done in 2012, it was found that the survival rate to be 94.4% at 5 years, 93.5% at 10 years and 82.93% at 20 years. The maximum number of failures found by these authors was a ceramic fracture. People with parafunctional habit especially bruxism and discoloration at the margins in smokers showed more failures. Yet another study reported 97.5% survival rate at 7 years.
RECOMMENDATIONS AND CONCLUSION

The porcelain veneer is very esthetic and conservative treatment option for many indications. The success of porcelain veneer depends very much on the method of fabrication and most importantly case selection. The research in this field has been based on personal preference and anecdotal information, more objective research is required so that porcelain veneer will become better successful.

REFERENCES