



## Cover-up damage for a sweet smile with overlay: A review of literature

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### ABSTRACT:

In recent years, laminate veneer restorations have been used in dentistry as a more conservative and esthetic treatment option. Dental veneers are thin, tooth-coloured shells that are bonded to the front surfaces of teeth to improve their appearance and give patients a more attractive smile. Veneers are placed in a minimally invasive technique that requires only a small bit of enamel to be removed in order for them to fit properly. Dental laminates serve the same purpose as veneers, and the two phrases are occasionally used interchangeably. Laminates are different in that they are much thinner and require less enamel removal to be installed. Due to their qualities that are similar to enamel, these veneers have aesthetic potential.

**Keywords:** veneer, laminate, lumineers, dental porcelain, esthetic

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### I. Introduction

One of the most difficult aspects of aesthetic dentistry is restoring the anterior teeth. Along with function and phonation, it is one of the most essential issues in dentistry. The most commonly favoured procedure for solving aesthetic concerns like as colour, structural abnormalities, and anomalies in the position of anterior teeth is to cover the teeth with partial or full coverage crowns. Tooth decay caused by the loss of healthy tooth structure and harm to the neighbouring soft tissues are two primary drawbacks of full coverage crowns. Every product or procedure utilised in dentistry has the goal of providing successful dental therapy while being conservative and attractive. As a result of improved aesthetics and minimum invasiveness, the usage of laminate veneers has increased in recent years [1]. They just require a small amount of tooth preparation, about 0.5 mm to 0.7 mm of enamel reduction [2]. Pincus began producing laminate veneers in the 1930s. He did the same thing with air-fired porcelain. Bunocore's acid etching research in 1955 and Bowen's resin Bis-GMA's introduction in 1960 paved the way for composite to be used as a veneering material. Shorter working time, lack of wear resistance, and delamination were among its drawbacks. The first to discover that chemically treating silica particles prepared their surfaces to link with a polymer base (bisphenol A-glycidyl methacrylate, bis-GMA) when cured, resulting in a strong restorative material, and to employ composite as a composite veneer. In 1975, porcelain overtook wood as the most popular material for laminate veneers, when Rochette introduced etching porcelain [3][4]. Dr. Sigal Jacobson, an Australian dentist, created the Uveneers (Ultradent) veneer template method (Burke, Lucarotti, 2009). Uveneers may now create highly beautiful repairs thanks to a new generation of composite materials. One of the most aesthetic ways to improve the appearance of your smile is with porcelain laminate veneers. Porcelain veneers enable for minor changes in tooth location, shape, size, and colour. As a result, it's considered a more conservative solution than a crown, which requires substantial tooth structural removal [1][2]. Although they are not the only option for all cosmetic issues, when they are the treatment of choice, they provide genuinely stunning results [4].

## II. Literature survey

### Classification

Preparation and veneering are divided into reduction (also known as space needed, working thickness, or material room), volume of enamel left, and percentage of dentin exposed, according to a proposed classification system [5]. Using this type of metric on a case-by-case basis provides an accurate measurement system for quantifying tooth structure elimination, with preferably no reduction, eliminates uncertainty, and aids in numerous aspects of treatment planning and communication. Shillingburg and Grace discovered that with ageing, the thickness of enamel on the anterior teeth's facial surfaces decreases. On the cervicofacial surface of the central incisor, enamel thickness varies from 0.17 mm to 0.52 mm, with a mean thickness of 0.31 mm 1 mm above the cemento-enamel junction (CEJ). The midfacial surface thickness, measured 5 mm from the CEJ, ranges from 0.45 to 0.93 mm, with a mean thickness of 0.75 mm [6][7]. The enamel bond is unsurpassed in terms of durability, little invasiveness, conservatism, and predictability. It imitates the DEJ, or natural link between enamel and dentin, according to Magne. Even bonding to dentin is preferred over non-adhesive methods [22]. Total-etch three-step systems, or three-step etch-and-rinse, remain the "gold standard" [8][9].

#### A. Based on tooth preparation for anterior veneers [12]

- **Class 0:** No preparation. **Fig. 1A**
- **Class 1:** Window preparation (window). Below the incisal edge, the veneer comes to a close. **Fig. 1B**
- **Class 2:** Technique for preparing feathered edges (feather). The veneer continues all the way to the

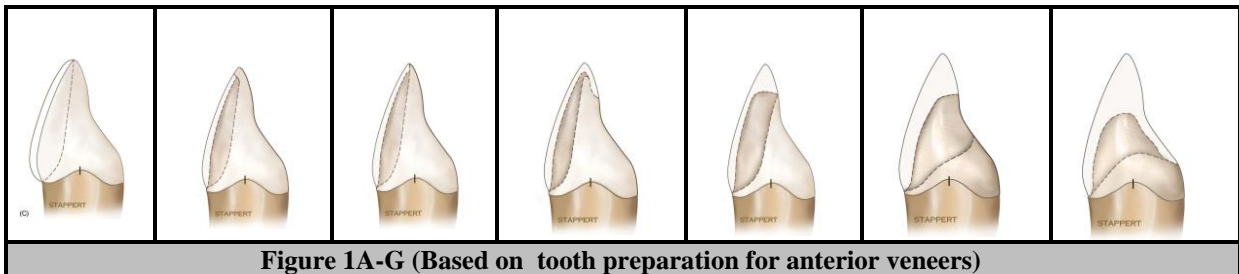


Figure 1A-G (Based on tooth preparation for anterior veneers)

incisal edge; the incisal edge is not shortened. **Fig. 1C**

- **Class 3:** Preparation of the bevel (bevel/small butt joint). Buccopalatal bevel; the incisal edge has been reduced. **Fig. 1D**
- **Class 4:** Incisal edge preparation overlapping (incisal overlap). The preparation's incisal edge is reduced, and the palatal extension is increased. **Fig. 1E**
- **Class 5:** Butt joint preparation. Incisal decrease of 2 mm, lingual marginal finish at 90 degrees. The contact areas are included in the interproximal preparation. **Fig. 1F**
- **Class 6:** Preparation of the full veneer (complete veneer). Extension of the interproximal and palatal preparations, such as the palatal deep chamfer or the rounded shoulder preparation. **Fig. 1G**

#### B. Based on Methods of Preparation [13]

- **Indirect veneers:** It is done indirectly including lab transfer procedure include fabrication, sintering, degassing, polishing. **Fig. 2A**
- **Direct veneers:** Restorative filling material directly placed over the prepared tooth. **Fig. 2B**

#### C. Based on materials [13][14]

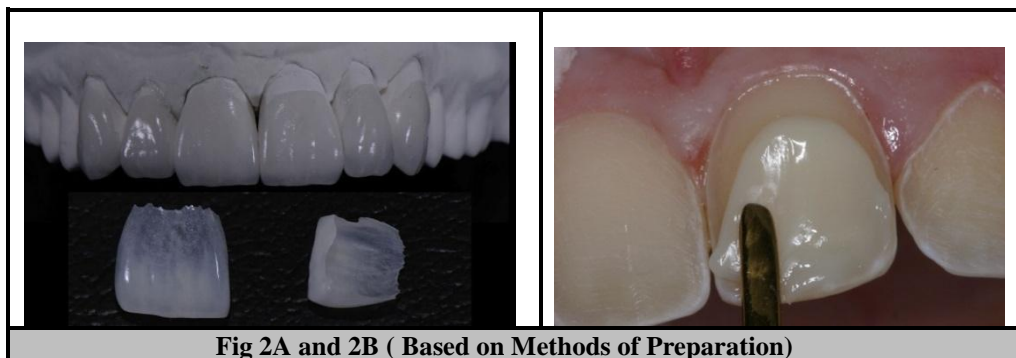


Fig 2A and 2B (Based on Methods of Preparation)

- **Acrylic resin veneers:** The veneering or lamination of a crown's frontal surfaces; usually refers to a crown, fixed partial denture, or removable partial denture or the purpose of veneering a dental prosthesis with acrylic resin is to give the visible sections of the restoration a natural tooth appearance. **Fig. 3A**

- **Ceramic veneer:** A thin, bonded ceramic restoration that repairs the facial, incisal, and proximal surfaces of teeth that require aesthetic restoration. **Fig. 3B**
- **Composite veneer:** a thin, bonded composite resin restoration that restores the facial, incisal, and part of the proximal surfaces of teeth requiring esthetic restoration. **Fig 3C**
- **Lithium disilicate (very thin and relatively very strong porcelain)** When compared to other materials, lithium disilicate ceramic material produces the thinnest veneers and has superior characteristics. In both cases, tooth preparation was limited to enamel using porcelain veneer preparation burs (Pivo, Korea). Lithium disilicate ceramic veneers are the least intrusive since they only require a little amount of tooth reduction. **Fig. 3D**

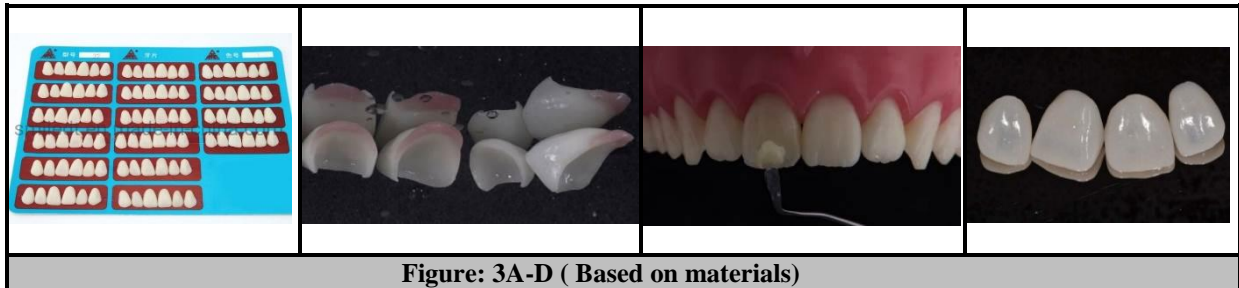


Figure: 3A-D ( Based on materials)

- **Da Vinci (Very thin porcelain)**  
It's a high-end, ultra-thin veneer. These porcelain veneers are hand crafted and are of tooth-coloured ceramics. Da Vinci Dental Studios in California manufactures these. They are indicated for chipped teeth, mishapen teeth, discoloured teeth, spaces between the teeth, and teeth that are crowded [13].
- **Mac (Stain resistance is high, and the fabric is relatively sturdy)**  
(Micro advanced Cosmetic Division veneers) They're ceramic veneers that have been pressed. Micro dental laboratories are where they're made. They are denser and have a higher strength than other veneers [13][14].
- **Componeers:** Componeers, a newer alternative in the dental market, was recently introduced (Coltene Whaledent). Some of the benefits of direct composite and ceramic restorations are available with prefabricated composite veneers, such as the need for only one session and no impressions to be taken and sent to the prosthetic laboratory. The Componeer is an enamel veneer made of nano-hybrid composite materials that combines the benefits of direct composite resin and laboratory-fabricated laminate veneers. Furthermore, the context of this method is based on the "natural layering concept," in which two layers are able to simulate the natural anatomy of a tooth using an incremental technique [36]. **Fig. 3E**



Figure 3E: Componeers

Tables 1 and 2 illustrate the foundation for a new veneer classification system in the absence of universally accepted porcelain veneer tooth preparation requirements. [5].

#### Indications

Dentistry has long been on the lookout for the perfect restorative material to improve the appearance of unsightly smiles. Although veneers are no panacea, they do provide remedies for the following clinical scenario that are both conservative and aesthetically pleasant.

#### To Prepare, or Not to Prepare

The most significant consideration for preparing teeth for veneer restorations, according to McLaren, is the substrate, which should ideally be mainly enamel. While one of the obvious advantages of prep-less veneers is adhesive bonding to enamel, he claims there is one drawback to not slightly preparing enamel. Hence, preparation is needed mainly to

- Establish a clear finish line.

- Make enough room
- Obtain a layer that is high in fluoride
- For optimum retention, use a rough surface

**Indications:**

- localised defects
- generalised defect
- intrinsic discolouration
- Diastema
- Chipped tooth
- worn dentition
- misaligned teeth
- excessively discoloured teeth
- hypocalcification
- peg laterals
- lingually positioned tooth [13]

Today, the majority of authors feel that tooth preparation is critical for long-term success. Conservative intra enamel preparation is recommended, with face enamel reduction of 0.3-0.5 mm and a finish line set at or near the gingival margin. Tooth preparation should not include any acute internal angles, especially at the incisal edge, where the tension would be greatest; instead, it should provide for a clear passage for the veneer to be inserted [13]. The indications for placement of veneer have been described in table 3.

**Contraindications**

- Tooth enamel that isn't thick enough or isn't thick enough for appropriate retention
- Severe crowding
- Bruxism and clenching are examples of dysfunctional habits
- Because of the huge volume of supporting tissue, large Class-IV lesions should not be repaired with veneers.
- The lack of a tooth-coloured backing in porcelain [2].

**Veneer preparation**

There are two stages to tooth preparation for veneer production;

- A. Shade selection
- B. Tooth preparation

***Shade selection***

The choosing of a shade is an important part of the veneer preparation process. The correct colour selection is critical to the veneer's performance. Prior to the preparation of the veneers, it is necessary to choose a shade. The various factors which affect the shade selection are as follows:- **Fig. 4**

1. Lighting of the operator's room colour corrected natural daylight and light are chosen above other sources of illumination sources of light in shade selection.
2. Because the tooth appears whiter when dried, shade selection should not be done on it. Isolation using cotton rolls and a rubber barrier should also be avoided when choosing a shade.
3. The erroneous interpretation of colour is caused by a lack of colour acuity and colour exhaustion caused by gazing at an object for a long time.
4. Prior to choose a colour, any stains or plaque on the tooth's surface should be removed.



**Figure 4: Shade Selection**

### ***Tooth preparation***

Cardinal rules for preparation:

- As far as feasible, the preparation should be conservative.
- Without making the tooth appear overly thick, the preparation should allow for a veneer covering of 0.3mm to 0.5mm.
- The dentin should not be penetrated by the preparation.
- The gingival margin should be cleanable after the preparation.
- Sharp angles should not be included in the preparation.
- There should be no undercuts in the insertion path of the preparation.
- Interproximally, there should be enough clearance.
- A clean finish line should be created for proper placement.

- **Enamel reduction procedure**

- a. **Labial preparation**

The buccal plane (which is convex) of the incisors requires preparation in three planes: incisal, middle third, and cervical planes. A meticulous labial reduction of tooth structures is performed to achieve a minimum preparation of 0.3mm (feldspathic porcelain) or 0.6mm (Empress aesthetic, e.max) [15][16].

There are numerous ways to get the needed decrease with the preparation:

- i. Freehand;
- ii. Use of depth cuts/grooves. To manage tooth preparation, depth cutters, grooves, and dimples have been advocated, as the usage of standardised items allows for reliable depth judgement **Fig. 5**; or
- iii. Use of silicone putty index.



**Figure 5: labial reduction**

A silicone index, which can be generated by the dental ceramist from the original wax-up model, can aid in determining the degree of tissue reduction. From an occlusal perspective, this can be split into horizontal pieces and peeled back to analyse alternative vertical placements of the decreased teeth. The use of a silicone index produced from the wax-up allows for observation of the reduction needed to accomplish the form and curves of the finished veneers' pre-planned shape and length [2]. **Fig. 6**

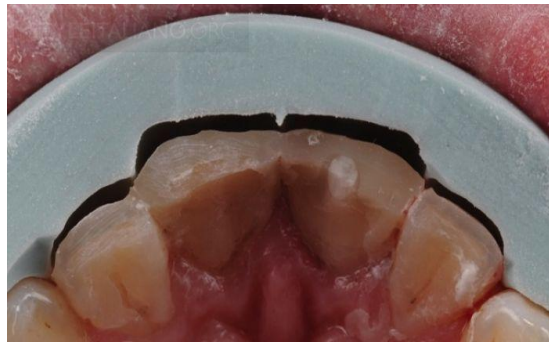


Figure 6: Putty indexing for labial reduction

**b. Proximal preparation:** This interproximal preparation can be done either by stopping short of breaking the contact or by preparing through the contact point. Some cases, such as when modifying the form or position of teeth, breaking the contact (also known as "slice preparation") may be required to clear the contact. With the extra space inter-proximally, the ceramist has more flexibility in adjusting the shapes and position of the teeth [15][16]. **Fig. 7**



Figure 7: Putty indexing for interproximal reduction

**c. Incisal edge reduction**

Various preparation designs, such as feather and window preparations with no incisal edge reduction, have been encouraged or lingual surface preparation to other preparations with incisal edge reduction. The author favours an incisal preparation that extends from buccal to palatal and reduces the incisal edge by up to 1.5 mm [17][18][19]. **Fig. 8**

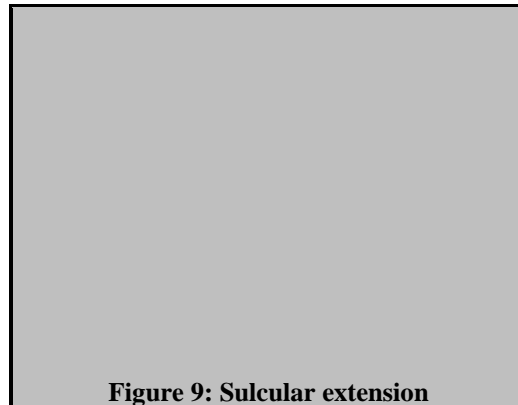


Figure 8: Incisal reduction

**d. Sulcular extension and marginal placement**

With a maximum depth of 0.4mm, a chamfer design is created should be used for the cervical preparation for a veneer. This allows the veneer to mimic the shapes of natural teeth without being too sculpted [20]. Additionally, it facilitates veneer sitting and reduces pressures, strengthening the veneer's future fracture resistance. The thin translucent porcelain crown margins, in contrast to crown edges that are typically buried in

the sulcus provides for a "contact lens" look in which the edges merge together with no obvious boundary. This allows for either equi-gingival or supra-gingival margins. Furthermore, there is a greater chance that the margins will be enamelled. Because the apical migration of gingival borders reveals no clear distinction between the veneer and the natural tooth, this "contact lens effect" may increase the veneer's longevity. A supra-gingival margin provides several advantages, including a lower danger of exposing dentine and a lower risk of soft tissue injury during preparation. It's also easier to make an impression because there's no need to backtrack and there's a better chance of capturing a distinct margin. Because the edge is more likely to be in enamel, there is less microleakage when enamel bonding is used. Caries or previous restorations that extend subgingivally may necessitate the use of subgingival margins [20][21][22][23]. **Fig. 9**



**e. Facebow Transfer and Bite Registration**

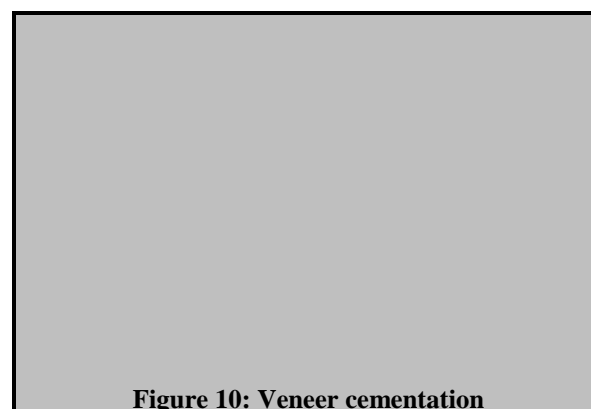
It's vital that they get a "stick bite" or "symmetry bite" to communicate to the dental technician the correct ultimate orientation of the proposed veneers' incisal plane. This might be as simple as registering the midline and inter-pupillary line to the teeth with two sticks within the bite registration [22].

**f. Temporization**

According to certain dentists, provisionalisation is not required with veneers because the tooth reduction required is minimal. Others, on the other hand, believe that temporization is an important element of the therapy process, especially since provisional (if taken from the diagnostic wax-up) results provide a preview of the eventual result to the patient [2].

**g. Cementing veneers**

To establish proper isolation, a rubber dam should be used, which helps to produce a clean, dry environment and reduces contamination from saliva and blood [4]. Because light-curing composite resins have a longer working life than dual-cure or chemically-cured composites, they are recommended for veneer cementation. This gives enough time to remove extra composite before curing, reducing the number of steps in the finishing process. In comparison to dual or chemical cure composites, light curing resin cements have substantially higher colour stability [16]. **Fig. 10**



Because of the thinness and transparency of veneers, dual cure resin cements include tertiary amines, which can cause long-term colour change ("amine discoloration") and overall darkening, making them unsuitable for veneers [16]. Different coloured resin cements have an effect on the final result and are usually used to fine-tune

the final shade of the restoration to achieve the desired result. It has a minor impact, accounting for less than 10% of the restoration's final colour, although it may be valuable in fine-tuning the final aesthetics [2].

#### ***h. Finishing and polishing***

There should be very little cement to clean up around the edges if the bonding technique was done successfully with a well-fitting veneer. It's not a good idea to use a rotary tool to polish the margins since it could dissolve the glaze layer, making the porcelain rougher and increasing plaque retention. A #11,12 blade is preferable for carefully removing excess cement but a fine diamond can be used to adjust the porcelain if necessary, and then it is gently polished [2].

The occlusion is first evaluated using centric occlusion, then with additional excursive movements. To modify the porcelain, rugby-shaped diamonds with water spray might be utilised. Any adjustments must be further polished [3].

#### **Advantages**

- In terms of preparation, it is extremely conservative. It is sufficient to reduce the enamel by 0.5 mm or less
- Porcelain veneers give teeth a lifelike appearance.
- Biocompatibility: Because of the highly glazed porcelain surface, tissue tolerance is great, resulting in minimal plaque accumulation.
- Porcelain veneers are stain-resistant
- The porcelain veneer is delicate, but once adhered to the tooth, it is quite sturdy.
- The etched porcelain veneer has a much stronger attachment to the enamel surface than any other veneering technology [2].

#### **Disadvantages**

- Veneer placement necessitates a certain level of skill
- Once the veneers have been luted to the enamel, they cannot be restored.
- It's difficult to change the colour of the veneers once they've been luted in place on the enamel surface
- Fragile veneer can break: Porcelain veneers are highly delicate throughout the try-in and cementation procedures, despite their strength when cemented to the tooth.
- Impossibility of trial-cementing the restorations: They can't be temporarily held in place with a provisional cement for testing.
- Expensive [2].

### **III. Conclusions**

The veneer is very esthetic and conservative treatment option for many indications. The success of 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 veneer will become better successful.

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