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# Different tooth preparation in direct composite, indirect composite and ceramic veneer - A review

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## Abstract
A review of different tooth preparation in direct and indirect composite veneer and ceramic veneers. An electronic search for "direct composite veneer," "indirect composite veneer," and "ceramic veneer" through the dental literature databases Scopus, MEDLINE, and PUBMED. References from studies and reviews were also selected for more information. Incisal overlap preparation shows excellent aesthetic and longevity. The clinician's preference ultimately determines the preparation design within the constraints of the literature currently available. However incisal overlap preparation appears to have the most predictable results of all the tooth preparations.

**Keywords:** Direct composite veneer, Indirect composite veneer, ceramic veneer, preparation design, anterior teeth, survival rate of dental veneer, restorative procedure.

## Introduction
The restoration of the anterior teeth is a challenging clinical issue. The patient's demand for treatment of unesthetic anterior teeth is steadily growing.[1] Dentists must satisfy patient's high standards for aesthetics.[2] Dental veneers have been used to enhance the appearance of anterior teeth since the 1930s.[3] Veneers are commonly used in cases like stains (intrinsic or extrinsic), enamel defects (gross enamel hypoplasia of anterior teeth, amelogenesis imperfecta), presence of diastema, teeth with abnormal shape and form and malaligned teeth (when orthodontic treatment is not recommended, to provide the aesthetic illusion of straight teeth).[4] Unfavourable conditions of dental veneer include teeth with enamel deficiency, teeth with severe occlusal wear pattern due to parafunctional habits, extensive periodontal involvement and inadequate oral hygiene.[5]

Sound mechanical, biological, and aesthetic principles are necessary for a restoration to be successful. These conditions must be met for the perfect restoration.[6] Direct composite, indirect composite, ceramic, and porcelain veneers are materials that are frequently used. The early materials had several drawbacks, including the requirement for materials that were excessively thick for covering discolorations, polishing difficulties that could abrade the opposing dentition and easy staining.[7,8] Over the years, experts and producers of dental materials have worked to create novel materials with improved cosmetic qualities. Laminated veneers, which were formed of cross-linked polymeric veneer and had a thickness of 1 mm, were first launched in 1975 as a more effective material to cover the dentition.[9] Less chair time and improved aesthetics were the outcomes of using laminate veneers.[10] The progress of developing new materials reached in 1980.[11,12]

The process of applying a thin veneer to a tooth is called veneering. Veneers offer a painless, minimally invasive, and efficient way to dramatically enhance smiles, providing lasting improvements.[13]

Despite their wide range of restorative indications, composite resins have some limitations, mainly owing to their high degree of surface wear, roughness, and staining, as well as color change over time.[14] With composite veneers, less preparation is needed. As a result, enamel can be preserved for strong retention. It has been shown that etching ceramic and enamel have a stronger bond than resin composite and enamel. Accordingly, it has been noted that composite veneers do not considerably improve the prepared tooth's rigidity. Even though dental laboratories can create composite veneers indirectly, the composite that is used is almost the same as that which is applied directly. Consequently, it has the same physical characteristics as direct composite restorations, including polymerization shrinkage, and a unique set of limitations.

Conversely, ceramic materials have also been widely utilized in the restoration of anterior teeth, either in the form of laminate veneers or complete crowns.[15] Many patients prefer ceramic veneers because they can be used for aesthetic purposes with little to no tooth preparation—the enamel alone may need to be slightly prepared to give the veneer thickness and ensure strength and color. The ceramic veneers are superior to direct veneers in that there is a significantly lower chance of discoloration or the formation of recurring cavities beneath them. Because of the material used in construction and the bonding mechanism, indirect veneers have limitations and causes for concern. They are also impacted by parafunctional behaviors like bruxism. The most common problems with these kinds of restorations are dislodgment and fractures.

Conservative treatment that can provide the patient's expected outcomes is always the first preference in the treatment plan. In this regard, ceramic veneers are among the more aesthetically acceptable and conservative treatment alternatives for achieving more pleasurable and beautiful smiles.[16]

In addition to improving the material type, new preparation designs for dental veneers have been introduced in response to the need for more long-lasting aesthetic results.

### Preparation design

Different kinds of preparation designs are employed in the field of dental veneers. The four different main designs of teeth preparation are as follows,

**1) Window preparation or inter enamel preparation**

When teeth need to be minimally prepared that is, when stains or discolorations are removed without the necessity for crown length correction—the window or inter-enamel preparation is utilized. The labial or facial tooth surface receives the majority of preparation in this approach, with the incisal portion only receiving preparation from the facial surface. The palatal and incisal edges receive no preparation at all. The depth is equal to half the thickness of the facial enamel (mid-facial: 0.5 – 0.75 mm; gingivally: 0.2 – 0.5 mm). Reduced retention and a weaker incisal portion of the ceramic veneers are the evident cons. This method is commonly used in direct composite veneers. It reduces wear on opposing teeth and protects the lingual, incisal, and functional surfaces of the tooth.[3]

**Fig 1**

**2) Feather preparation**

In this kind of preparation, the incisal edge of the tooth is prepared bucco-lingually, but the incisal length is not reduced. It is commonly preferred in ceramic veneers.

**Fig 2:**

**3) Incisal Bevel preparation**

The outline form for the incisal bevel preparation covers the entire face and extends 0.5 to 1 mm cervically to the gingival tissue level. The incisal bevel of 0.5-2 mm will result in nearly a butt joint and the palatal reduction of the incisal edge will result in a chamfer finishing line. The incisal bevel will significantly achieve this goal, especially in the case of many ceramic veneers, and increase the strength of the veneer while lowering the chance of the thin shell of unsupported veneer ledges fracturing.[3]

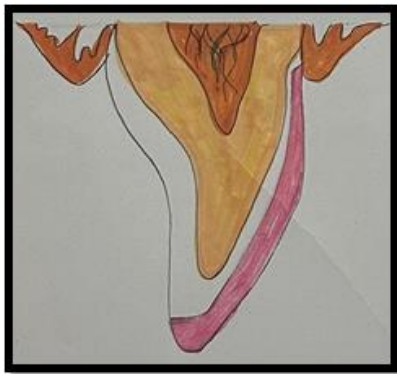

**Fig 3:**

**4) Incisal overlap preparation**

The entire labial surface is included in the outline form for the incisal overlap preparation, achieving 0.5 to 1 mm cervical to the mark at the gingival tissue level. A butt joint will occur from the 2-4 mm incisal bevel, and a chamfer finishing line will arise from the lingual decrease of the incisal edge. Hence, the veneer is extended to the palatal aspect of the tooth by reducing the length (by roughly 2 mm) and preparing the tooth bucco-lingually. In ceramic veneer, it's commonly used. The incisal overlap preparation disperses occlusal forces over a greater surface area and offers the optimum support for the restoration.[3]

**Fig 4:**

## Discussion

Despite there are different results and research that investigate the influence of preparation design on the survival of the restoration.

Preparing the incisal overlap appears to disperse occlusal

forces across a greater surface area and offer the optimum support for the restoration.

The incisal third of the window is subject to a large concentration of occlusal force during window preparation, which could fracture the restoration. Additionally, reducing the incisal edge can help establish incisal translucency more effectively. With window preparation, the lifespan of the veneer and cement layers may be extended since deformations and strains remain within physiological limits. The type of window preparation exhibited a gradual increase in stresses as the elasticity of the veneer layer increased (which was associated with rigidity). This might be attributed to the increased material resistance to deflect under load and transfer load to structures underneath at the veneer layer finish line. This was in line with the results of Chai et al. (2021) in photo elastic research, which showed that stresses were better distributed over a larger surface area when the veneer was used to cover the incisal edge.[17]

According to studies, patients who prefer minimally invasive procedures may prefer composite veneers over ceramic veneers. According to the systematic study conducted by Aljazairy in 2020, veneers are regarded as an effective restoration type due to their high success rate.[17]

## Conclusion

The fibers of the periodontal ligament and the cortical and cancellous bone are indifferent to veneer material; nevertheless, slight alterations in loading position or preparation type may be observed. In the loading transfer mechanism, the veneer layer finish line and its interaction with the cement layer and tooth structure are critical components. The type of preparation thus modifies the levels of strains on veneer layers, cement, and tooth structure.

Generally, the preparation geometry is determined by the clinician's preference. However, veneers with incisal coverage appear to yield more aesthetically pleasing and consistent results; it seems superfluous to have a chamfer finish line, and it makes more sense to limit the preparation to a butt-join finish line. Numerous clinical trials have shown that ceramic veneers provide good aesthetic outcomes, treatment endurance, and patient satisfaction; the two most important requirements for a successful outcome are bonding to enamel and the absence of parafunctional habits. When compared to ceramic veneers, composite veneers tend to fail much more quickly because of their physical characteristics and bonding strength, even though they both yield good aesthetic results and patient satisfaction. Additional clinical trials are required to assess various composite kinds and new ceramic systems over extended periods of observation.

The ultimate purpose of veneers is to improve appearance by creating an attractive smile. Veneers are a helpful adjunct to a dentist's armamentarium for treating cosmetic issues in both young and old patients. To achieve the best outcomes, caution must be used both during the luting phase and during tooth preparation. Veneers are now a more conservative and aesthetically pleasing option for full coverage restorations due to developments in acid-etch, resin bonding, and material qualities. A key factor in the loading transfer is the veneer layer finish line and its interaction with the cement layer and tooth structure.

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## Conflict of Interest

None.

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