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Overview on Dental Veneer Placement

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Cosmetic dentistry aims to improve the appearance of teeth while causing as little damage as possible. The restoration of the smile is one of the most common treatments performed by dentists. Repairing damaged, deformed, or crooked teeth can improve one's beauty significantly, boosting one's self-esteem, attitude, and social interactions. Veneers are considered one of the most conservative surgical treatment approaches since they only remove around half of the enamel thickness before veneer placement, leaving the remaining portion undisturbed. Bonded laminate veneer repairs have been demonstrated to produce good results for up to ten years in numerous clinical investigations. Regular dental veneer materials had a number of drawbacks, including the necessity for materials to be overly thick to mask any discoloration, difficulties in polishing, which can result in scratching of the opposing dentition, and the ability to stain.

Keywords: Dental veneer; cosmetic dentistry; crooked teeth; composite resin.

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1. INTRODUCTION

Patients nowadays want their teeth to last longer and for their dentist to assist them in achieving their goal of retaining their teeth for a lifetime. The development of new technologies and bonding processes has altered dentistry, allowing cosmetic procedures to mask the signs of ageing [1–4]. The demand to have unsightly front teeth corrected continues to grow. Although conservative treatments such as bleaching and direct composite laminate veneers have the advantage of being trustworthy, more aggressive techniques such as full crown restorations are provided to restore their aesthetics. On the other hand, crown preparations are linked to a number of issues, including substantial removal of sound tooth structure and permanent impacts on the dental pulp [5,6].

Irfan Ahmad proposed the HFA trinity, which asserts that dental care should be centered on the patient's health, function, and appearance. For the aesthetic rehabilitation program, a collection of preoperative and postoperative diagnostic images of patients, diagnostic models with wax ups, resin mock-ups on the patient, and simulations utilizing computer imaging are used. Veneers are thin layers of tooth-colored material applied to a tooth's surface to remedy defects and discoloration. Veneers are made from chair-side composite, processed composite, porcelain, and compressed ceramic materials. Laminating is the process of placing a thin veneer of prefabricated porcelain, composite resin, or plastic material over a tooth. Laminates can effectively modify smiles in a comfortable, safe, and rapid manner, with long-term results [7,8].

Veneers are considered one of the most conservative surgical treatment approaches since they only remove around half of the enamel thickness before veneer placement, leaving the remaining portion undisturbed. Bonded laminate veneer repairs have been demonstrated to produce good results for up to ten years in numerous clinical investigations. In recent years, composite cements, adhesive techniques, and easier cementation have all improved [9-11].

Direct composite veneers were first developed in the late 1970s and early 1980s, however they were unsatisfactory because of bad stability of the colour, glossy surface maintenance, and erosion [12]. Nowadays composites have much enhanced physical and aesthetic qualities, allowing for non - invasive treatment techniques with instant results that satisfy even the most cosmetically discriminating patients. Porcelain veneers, on the other hand, necessitate a more extensive and permanent tooth procedure. Dentists have determined that indirect porcelain veneers offer superior average survival rates and attractiveness. They do, however, necessitate at least two sessions and, in certain cases, extensive tooth preparation(13-15).

Dental veneers are considered a dependable aesthetic restoration of anterior teeth, according to many studies, with a survival rate of 91 percent after 20 years [16]. Regular dental veneer materials had a number of drawbacks, including the necessity for materials to be overly thick to mask any discoloration, difficulties in polishing, which can result in scratching of the opposing dentition, and the ability to stain. Over the years, researchers and makers of dental materials have worked hard to create novel materials with improved cosmetic properties. Laminate veneers, which had a thickness of 1 mm and constructed of a cross-linked polymeric veneer, were developed in 1975 as a preferable material for masking the dentition. Using laminate veneers produced a more pleasing aesthetic effect and reduced chair time. In the 1980s, porcelain was added to the dental veneer materials, the surface of the porcelain was modified to achieve better bonding [17-19].

For dentists who lack therapeutic skills or expertise, preparing porcelain laminate veneers can be an unpleasant procedure. Restorations that fail due to a lack of procedural understanding are common. Various studies on the endurance and effectiveness of porcelain laminate veneers implanted by general practitioners or experts have been conducted, where results showed acceptable results regardless of the kind of defect and/or the design of the veneer itself. In Ireland, some undergraduate students had placed a veneers and their clinical performance was studied and indicated that the restorations were likewise satisfactory. However, no research on the effectiveness of porcelain laminate veneers applied by dentists has been conducted in Saudi Arabia [20-22].

Composite resins, on the other hand when used as veneers, suffer from shrinkage, structural changes by heat , discoloration, an inadequate resistance to abrasion, and have a short lifespan

of four years or less. Although the acrylic laminates veneer attempted to address some of the issues, their long-term outcomes were clinically undesirable. Clinical studies recently have demonstrated that anterior porcelain veneers have a very good long-term effect. In one 5-year trial, 83 percent of participants were satisfied, while 95-97 percent were successful in an 8-year study. However, owing of the need for tooth preparation, porcelain installation is an irreversible process. For long-term success, the parameters for porcelain veneer must be thoroughly studied before the method is done [23,24].

2. DIAGNOSTIC CONSIDERATIONS

2.1 Assessment of the Face

The form of the face, skin colour, symmetry, and maxillary and mandibular lip lines should all be considered. Veneers with long narrow teeth to accentuate the facial shape or round and short teeth to ease the narrowness of the face may be desired by patients with a narrow face. Veneers seem brighter and higher in value as the skin tone lightens becomes darker while appears yellow and lower in value as the skin tone lightens.

2.2 Assessment of the Smile

It's crucial to evaluate the teeth's shape, structure, and colour. The position of the maxillary incisal edge in respect to the lower lip, the degree of gingival exposure while smiling and talking, and the general performance of the smile should all be noted by the doctor. When smiling, the smile line should align with the slope of the lower lip in an optimal dental configuration. The smile zone is the area around the teeth and tissues that is visible when smiling. Straight, curved, elliptical, bow, rectangle, and inverted smile zones are the several forms of smile zones. This is useful for assessing the smile [25].

2.3 Photographs

The pre-operative pictures record the patient's condition prior to surgery and assist the technician in veneer fabrication. A full-face smiling, a retracted anterior view with the shade tab held beneath the incisal borders of the maxillary incisors, a nearer image of the teeth to be veneered, and a post-preparation shot with the shade tab should all be included in this [26].

2.4 Computer Imaging

The patient and the doctor can get a realistic simulation of the predicted result by computer imaging the patient's mouth and smile and performing the appropriate alterations on the screen. When veneers are needed to extend teeth, close spaces, or rectify mal-alignment, the diagnostic cast must be prepared and waxes.

3. INDICATIONS AND CONTRAINDICATIONS OF DENTAL VEERS

Veneers can remodel teeth, making them suitable for a variety of clinical conditions such as:

Surface flaws, like as microscopic cracks in the enamel produced by age or stress, can damage and discolors the enamel. Teeth that are not very long, these teeth can be extended to make them more cosmetic and functional. Teeth replacement for missing or damaged pieces [27]. Tetracycline discoloration, fluorosis and teeth that have darkened with age and are, not suited for vital whitening [28]. For operationally sound ceramic metal or all ceramic crowns, unsatisfactory colour can be corrected.enhancing the appearance of rotated or misaligned teeth. Presence of diastema. And when orthodontic treatment is neither desired nor required, mal-aligned teeth can be modified using dental veneers to create the cosmetic appearance of straight teeth.

Although the veneer could be used in the correction and management of many dental conditions it still have some contraindications where it cannot be used such as: Teeth that have been too fluoridated or that are still growing may not be able to etc. Efficiently. A tiny, slender crown, usually found on the lower incisors, Teeth having insufficient enamel, Young permanent teeth. Patients with high caries rate.

Patients who have bruxism or other parafunctional habits put undue strain on their porcelain veneers. An alternative is for the patient to wear a protective biting device after treatment is done to protect the veneers from clenching or grinding pressures [29].

4. TYPES OF VENEERS

Veneers are classified into **direct veneers** (Composite resin veneers) and **indirect veneers** which are 3 types:

1. Conventional powder-slurry ceramic (feldspathic porcelain).
2. Heat-pressed ceramic. (e.g. IPS Empress 1 and 2, OPC).
3. Machineable (CAD/CAM) ceramics (e.g. CEREC).

4.1 Direct Veneers (Resin Composite)

The resin base, inorganic fillers, and binding agent are the three main components of resin-based composites. Bis-GMA (bisphenol A-glycidyl methacrylate) is the most often utilized monomer, and because it has a higher molecular weight than methyl ethacrylate resins, its polymerization shrink (7.5 percent) is lower than that of methacrylate resins (22 percent) .Lowering polymerization shrinkage, boosting the monomer's heat reduction coefficient, and improving mechanical characteristics are all advantages of including a range of fillers, such as quartz. With the help of saline, the resin and the filler are bound together. The most often used resin composite is y-MPTS (mercaptopropyl) (trimethoxysilane). The particle size of the filler is used to classify dental composites. Micro filled composites have a particle size of 0.02 m, while the average particle size is 10-20 m .Over time, the dental firm introduces new generations of composites, resulting in improved physical qualities and appearances [30,31].

The fundamental benefit of composite veneer is that it can be used right away, resulting in minimal chair time and a great first appearance. Composite veneers, on the other hand, are more prone to discoloration and deterioration. Composite veneers do not necessitate extensive preparation. As a result, the enamel can be kept for better adherence. It has been proven that the bonding strength of etching porcelain and enamel is superior to that of resin composite and enamel. Although composite veneers can be created indirectly in dental laboratories, it has been noted that composite veneers do not significantly restore the prepared tooth. The composite is essentially the same when applied directly. As a result, it has the same limits and physical properties as direct composite restorations, such as shrinkage due to polymerization [32-34].

Composite veneers have a consistent survival rate in several clinical tests. They used 87 direct composite veneers on 23 patients and reported an 89 percent survival rate after 5 years. Wolff et al. conducted a retrospective analysis on 327 direct composite veneers for 101 patients, with an estimated 5-year survival rate of 80%. A three-year survival rate of 87 percent was found in a recent randomized control trial comparing two distinct types of composites. The use of resin composite to veneer the anterior teeth is justified; it is a quick operation that produces an excellent aesthetic result and has a long lifespan [35,36].

4.2 Indirect Veneers

4.2.1 Conventional powder-slurry ceramic (Feldspathic porcelain)

Feldspathic porcelain is one of the most frequent materials used to make laminate veneers. Feldspar, a naturally occurring glass containing aluminum oxide, potassium oxide, sodium oxide, and silicon oxide, is the major component of feldspathic porcelain. Feldspathic porcelain provides a number of advantages. Because the material is brittle, it can be practically translucent, resulting in a natural-looking repair. It also necessitates very little teeth preparation as a result, enamel can be preserved [37,38].

Feldspathic porcelain is among the most used materials to make laminate veneers. Feldspar, a naturally occurring glass containing aluminum oxide, potassium oxide, sodium oxide, and silicon oxide, is the major component of feldspathic porcelain. Feldspathic porcelain provides a number of benefits. Because the material is brittle, it can be practically translucent, resulting in a natural-looking repair. It also necessitates very little teeth preparation.

As a result, enamel can be preserved. Furthermore, feldspathic porcelain can be etched with hydrofluoric acid, which provides great adhesion to the remaining enamel. As a result, feldspathic porcelain has few drawbacks. The platinum foil technique and the refractory die are two methods for making feldspathic porcelain. These procedures are technique-dependent, and the produced veneer must be handled with care before being bonded. Because porcelain is so delicate, masking badly discolored teeth may be challenging. Micro-cracks are formed by etching

the porcelain's inner surface, which results in a loss in the porcelain's strength properties and veneer breakage [2432,39-41].

The durability of porcelain veneers has been the subject of numerous investigations. Beier et al., [42]. reported a survival rate of 94.4 percent after five years and 93.5 percent after ten years in a retrospective clinical investigation; they discovered that the most common cause of failure is a ceramic fracture. Layton and Walton [43]. conducted a randomized clinical trial with comparable results, with a ten-year survival rate of 96 percent and a 20-year survival rate of 91 percent. In addition, Smales and Etemadi [44]. found that porcelain veneers had a 95% survival rate after 7 years.

4.2.2 Heat-pressed ceramic/glass-based ceramics

Glass ceramics could be an excellent choice for anterior restorations. Their physicomechanical qualities have enhanced, including resistance to heat shock, erosion and fractures. The interaction of the crystals and the glassy matrix, as well as the size and number of crystals, all influence property improvement. Stronger materials are made from finer crystals. Depending on the chemical composition and % crystallinity, they can be opaque or transparent. The use of appropriate fillers that are disseminated throughout the glass, such as aluminum, magnesium, and lithium disilicate, increases the strength of glassy ceramics. Ceramics reinforced with leucite and lithium disilicate are often used for cosmetic veneers because of their optical characteristics and acid sensitivity. To increase mechanical qualities and optical features such as opalescence, colour, and opacity, filler particles are added to the base glass composition [45-47].

4.2.3 Machineable (CAD/CAM) ceramics

Special partially sintered ceramic (zirconia), glassbonded ceramic ('Vitablock'), or glass-ceramic ('ips.emax' lithium disilicate) moulded into machinable blocks are used in recent breakthroughs in dental CAD-CAM technology. CAD/CAM restorations made with CEREC glass-ceramic technology appear to last a long time [48].

5. TOOTH PREPARATION

There are four main tooth preparation designs [49]:

Window preparation: The Incisal edge of the tooth has been maintained.
Feather preparation: The incisal dimension is not decreased, while the bucco-palatable of the tooth's Incisal edge is formed.
Bevel preparation: The length of the incisal edge is somewhat shortened, and the tooth's incisal edge is prepared.

Incisal overlap preparation: The bucco-palatable edge of the tooth is prepared, and the length is shortened (approximately 2 mm), allowing the veneer to be stretched to the palatal side of the tooth.

The impact of prepared design on the restoration's survivability is the subject of a variety of viewpoints and research findings. Incisal overlap preparation strengthens the restoration by spreading occlusal stresses across a broader surface area. On the incisal third, the occlusal stress is significant during the window preparation, resulting in a restorative fracture. When the incisal edge is decreased, incisal translucency is attained. It's debatable whether a chamfer finish line or a shoulder finish line is preferable (butt joint). The chamfer finish line at palatable is essential to tolerate occlusal stress, according to Troedson and Dérand [50] and Zarone et al. [51].Castelnuovo et al. [49] on the other hand, claimed that the restoration will last a long time independent of the chamfer finish line.

6. RECENT ADVANCES IN VENEERS

6.1 MAC Veneer

In 2005, the Micro Dental laboratory in Dublin introduced the MAC (Micro Advanced Cosmetic division) veneer. They're made of ceramic that's been crushed. They are tougher, thicker (0.8-1mm), and suit firmly and permanently over teeth than porcelain veneers. These custom-made veneers are durable, stain-resistant, and difficult to remove.

6.2 Da Vinci Veneers

Dr. Joel D. Gould unveiled them in 2008 at the Da Vinci laboratory in California. They are ultrathin, tooth-colored ceramic shells that are stain-resistant in the long run. The thickness ranges between 0.2 and 0.3 mm. They don't require any anesthetic procedures and require little to no tooth preparation. An impression is

taken and sent to the lab after the teeth are softly buffed to eliminate 0.5 mm of enamel thickness. There is no need for temporization. The color of the veneer can be varied depending on the colour of the luting cement [52].

6.3 Lumineers

Dr. Mat Carty introduced them in 1990, and the Den Mat firm manufactured them. They are the most widely used no-prep veneers. Due to its excellent strength, this extremely thin veneer (0.3–0.5 mm) can preserve its durability. Strassler et al [53]. investigated the colour stability, marginal integrity, discoloration, and secondary caries of 167 Cerinate Lumineers implanted with ultrabond for ten years and found that 94 percent of the 167 Lumineers were successful. Lumineers differ from normal porcelain veneers in that they are manufactured of a trademarked cerinate porcelain that is extremely robust but much more thin than traditional laboratory made veneers. Their thickness is similar to that of contact lenses.

6.4 E-max Veneers

Microstar Corporation first introduced it to the US market in September 1998 [54]. Available as ingots used by pressing or blocks for milling using CAD/CAM milling machines. Lithium disilicate veneers made from IPS Empress 2 ceramic. Crowns and bridges are the most popular applications. They are quite thin (0.3 mm) and can be used to augment the vertical dimension of the problematic teeth when used in conjunction with adjacent IPS e max bridges or crowns. They have a high bond strength and are cemented with resin cement, which has been the most popular over the last 15 years.

7. CONCLUSION

Dental veneers are one of the most important teeth aesthetics techniques because the shape of the teeth has a significant impact on one's appearance and self-esteem. Veneers can be made out of composite resin (direct veneers) or porcelain (indirect veneers), with the porcelain version showing better results than the resin version. Dental veneers are recommended in a variety of situations, including tooth discoloration, missing teeth or portions, and diastema. Before getting a dental veneer, several diagnostic tests should be performed, such as imaging, face and smile assessment, and lastly using a computer to generate a simulation of the results that both the dentist and the patient can be confident with. development in the filed of dental veneers is a promising filed to create new materials and get better results and overcome the disadvantages of traditional methods.

CONSENT

It's not applicable.

ETHICAL APPROVAL

It's not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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