Original Research Paper

Volume - 13 | Issue - 04 | April - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Dentistry

ADVANCES IN DENTAL VENEERS: A REVIEW

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ABSTRACT Veneers have made a breakthrough in dentistry in recent times. They have been predicted to increase a patient's self-confidence, personal relationship, and even success in his or her career. Hence, with veneers, it is possible to create amazing esthetic results and yet retain a considerable amount of tooth structure. Successful results depend not only on the clinical and laboratory technique used for the assembly of veneers but also on an understanding of the scientific background behind its material aspect and case selection. Veneers have evolved in the past 10 years or so in the material aspect. Various materials are used to fabricate veneers like composite, processed composite, porcelain, ceramic, preformed acrylic laminates, and glass-ceramic veneers. The current article is a review that illustrates recent advancements in the material aspect of dental veneers.

KEYWORDS : Dental veneers, Esthetics, Recent advances

INTRODUCTION

A veneer is a wafer-thin sheet of material which is placed on the front surface of the tooth, used for aesthetic purposes. It is usually a thin layer of restorative material replacing the enamel. The main difference between a veneer and a laminate is that a veneer is a layered material placed over the tooth to change the colour of the tooth, whereas laminates maintain the colour.[1]

Veneers are usually the material of choice for a conservative, esthetic approach as they are tooth coloured. This in turn improves the self-esteem, confidence thus boosting the social life of the patient. They were first used in 1928 by a California dentist Charles Pincus for changing the appearance of an actors teeth temporarily for a film shooting.[2] Since then there has been a great demand for veneers as an effective esthetic alternative.

Veneers are manufactured from various materials like ceramic, porcelain, composite resin, micro-filled composite resin, preformed acrylic laminates, glass-ceramic veneers etc.[2]

Indications:

- Localized or generalized defects
- Intrinsic discolouration
- Diastemas
- Chipped teeth
- Malaligned teeth
- Excessively discoloured teeth
- Hypocalcification
- Peg laterals[3][4]

Advantages:

- Painless.
- Lack the need of anaesthesia.
- Fast technique.
- Conservation of the tooth structure.
- No harm to the pulp and therefore elimination of post-operative sensitivity.
- Long-lasting restorations due to enamel bonding.
- High patient acceptance.
- Excellent esthetic.
- Easy to clean and maintain [5]

Over the years there have been innumerable advancements in veneers in dentistry. The recent advancements are:

E-max veneers:

Lithium disilicate (2SiO2eLi2O) which was first introduced in 1988, has now advanced from a heat-pressed core material marketed as IPS_ Empress 2 (Ivoclar Vivadent, Lichtenstein) to IPS" e. Max CAD manufactured in 2006.[6][7]

The e. Max CAD in a partially crystallized form contains 40% lithium metasilicate crystals, while in the fully crystallized form, it is composed of mainly 70% fine grain lithium disilicate crystals.[6][7]

The material is considered to be fully crystallized after being tempered at 850ºC for 20-25 minutes under a vacuum. In partially crystallized form, the material has a flexural strength of- 130MPa, fracture toughness of 0.91025 MPa, and Vickers hardness of - 5400 VHN. In fully crystallized form, the flexural strength of the material is 262-360 MPa, and the fracture toughness of 2.0-2.5 Mpa.

A "blue state" of the material, composed of lithium metasilicate has superior properties such as ease of milling, decreased bur wear, and high edge stability.[8][9]

IPS_ e. Max CAD addresses various esthetic needs by being available in a variety of shades (standard A through D) and three levels of translucency (medium opacity, high translucency, and low translucency).[7][8]

Magne et al., stated that lithium disilicate has a distinctive property, called the "Umbrella Effect" that allows light to cross the material and be adsorbed providing high esthetical properties and a more conservative dental preparation.[6]

The 2016, manufacturers recommended the use of IPS_ e. Max CAD for minimally invasive preparations (1 mm material thickness).[6]

The use of lithium disilicate veneers is advantageous as it allows the fabrication of ultra-thin veneers with a thickness ranging from 0.1–0.7 mm. Subsequently, it permits tooth reduction to be minimally invasive and also allows no preparation placement.[6]

Lumineers:
Lumineers were introduced by Dr. Mat Carty in 1990 and manufactured by the DenMat Corporation. [6] They have brought a revolutionary change in aesthetic dentistry. They are considered to be one of the best no-preparation veneers.(8) If preparation is required only a maximum of 0.3mm of tooth structure is removed.

Lumineers consist of a thin shell-like porcelain material, custom-made for patients, and applied to the tooth surface with the help of a permanent bonding agent.[9]

Lumineers are made from patented cerinate porcelain and their thickness is comparable to contact lenses. They are very durable, 10 years or longer with good oral hygiene according to clinical studies.[8]

Da Vinci veneers:
Da Vinci veneers were introduced by Dr. Joel. D. Gould in 2008 at the Da Vinci laboratory in California.[7] They are ultrathin shells of tooth-coloured ceramic whose thickness ranges between 0.2 and 0.3 mm.

They resist staining and mimick the natural appearance of the tooth. These veneers require little or no anaesthesia and a minimum tooth preparation of 0.5mm.

The longevity is good due to its high bond strength [7][10]

Durathin veneers:
Dr Wells and Mark Willes co-developed duration veneers. [11]Durathin veneers are custom-made from cerinate porcelain that adheres directly to the surface of the tooth without removing any enamel. They are as thin as a fingernail (0.3mm) whereas traditional veneers have a thickness of about 0.5mm. They are best suitable for patients who have existing veneers that require replacement. The advantages of durathin veneers include superior aesthetics, clinical longevity of about 5-10 years, painless procedure, no anaesthesia and minimal removal of tooth structure.[7]

MAC veneers:
The Micro Dental laboratory in Dublin introduced MAC (Micro Advanced Cosmetic division) veneers in 2005. They are manufactured from pressed ceramic.[5] They are sturdier, thicker (0.8- 1mm), and fit precisely and securely onto the tooth surface compared to conventional porcelain veneers. These custom-made veneers are long-lasting, stain-resistant, and not easily dislodged.[7]

Pre-fabricated composite veneers:
The concept of prefabricated composite veneers was formerly launched in the late 1970s (Mastique Veneer System, Caulk Dentsply) but presented with limited success as the large glass filler technology available at the time did not provide adequate esthetics and durability.[12][13][14]

However, the concept of prefabricated veneers rejuvenated 40 years later with the introduction of contemporary composite resin with improved mechanical and esthetic properties and, today, several products of this category are available on the market for single-appointment veneer restoration (Edelweiss Veneer by Edelweiss Dentistry, Componeer by Coltene, Novo.Lign Veneers by Bredent).[15]

Edelweiss veneers:
The Edelweiss Veneer was first of the "new generation" of prefabricated veneers introduced into the market in 2011. These Veneers feature an advanced fabrication technology with heat/pressure composite curing and laser sintering and their performance and resistance to fatigue is excellent in laboratory testing.[16]

They do not require taking an impression, no temporaries and no try-ons are required, and they can be bonded to the tooth structure like a direct composite restoration with no need for sandblasting, acid etching, post-etching cleaning or silane application. Furthermore, finishing and polishing the margins of a prefabricated composite sectional veneer are less technically demanding and time consuming than finishing and polishing the margins of a ceramic sectional veneer, since the procedure is not influenced by many variables (type of ceramic, type of polisher, polishing speed/pressure) [17][18] and can be accomplished using standard polishing systems for nanohybrid composite resin with no risk of adversely affecting the esthetic and mechanical properties and of initiating internal crack propagation. [19][20]

Componeers:
Componeer (Coltene, Altstätten, Switzerland) are thin composite resin shells (0.3 mm cervically and 0.6–1.0 mm to the incisal edge) that are prefabricated. These prefabricated veneers are made from a pre-polymerized hybrid composite resin, Synergy D6 (Coltene). These veneers can be cemented with the same hybrid composite resin from which they are fabricated, which has the potential of making the restoration a monoblock unit.[21]

A recent bond strength study reported that Componeer prefabricated veneers resulted in micro-shear bond strengths statistically similar to those of etched IPS e.max Press (Ivoclar Vivadent, Schaan, Liechtenstein) when the respective adhesive and luting composite was applied to the intaglio surfaces.

The high bond strengths obtained between the Componeer intaglio surface and the respective hybrid composite may be due to two mechanisms:

1. A strong adsorbed layer of polymer material that forms on the intaglio surface.[22][23]
2. Residual reactive methacrylate functionalities on the intaglio surface which may form a network with the bonding agent after polymerization, which, along with the wetting is a characteristic of 2-hydroxyethyl methacrylate.[24][25]

CONCLUSION

The ultimate goal of veneers is to augment aesthetics with a beautiful smile. Veneers are a useful adjunct for the management of various aesthetic problems in both young and aged patients. With the collective advancements in acid-etch, resin bonding techniques and material properties, veneers have transformed into a more conservative and highly aesthetic alternative to full coverage restorations.

Funding
None.

Conflict of Interest
None.

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