Original Research

Ceramic Lumineers and Periodontal Diseases: A Review of Current Literature

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Abstract:

Background:

Ceramic lumineers, also known as porcelain veneers, have gained popularity in recent years as minimally invasive cosmetic dental procedures. While the primary goal of lumineers is to improve the appearance of teeth, there is growing interest in their potential impact on periodontal health. This review aims to summarize the current literature on the influence of ceramic lumineers on inflammatory periodontal parameters.

Methods:

A comprehensive search of electronic databases was conducted to identify relevant articles published between 2010 and 2022.

Results:

The results suggest that ceramic lumineers have a limited impact on periodontal health, with no significant changes observed in measures of gingival inflammation or periodontal attachment levels. However, there are some concerns regarding the potential for plaque accumulation and difficulty in maintaining proper oral hygiene with lumineers. The literature also suggests that careful patient selection, adequate preparation, and appropriate cementation techniques are critical to minimizing any potential negative effects on periodontal health.

Conclusion:

In conclusion, while ceramic lumineers appear to have minimal impact on inflammatory periodontal parameters, more long-term studies are needed to fully understand their potential impact on periodontal health. Dentists should carefully consider patient selection and appropriate placement techniques to ensure the best possible outcomes.

Keywords: Ceramic Lumineers, Periodontal Diseases, Review of Literature.

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Introduction

Dental veneers are thin, custom-made shells made from materials such as porcelain or composite resin that are placed over the front surface of teeth to improve their appearance. Veneers are designed to cover imperfections such as discoloration, chipped or misshapen teeth, and gaps between teeth (1,2). They can also be used to improve the overall size and shape of teeth (2).

There are two main types of dental veneers: porcelain veneers and composite resin veneers (3). Porcelain veneers are more durable and long-lasting, and they have a more natural appearance (4,5). They are also more expensive and require more preparation of the tooth surface before placement (4,5). Composite resin veneers are less expensive and require less preparation, but they are not as durable as porcelain veneers and may need to be replaced more often (6).

The process of getting veneers typically involves several appointments with a dentist. During the first appointment, the dentist will prepare the tooth surface by removing a small amount of enamel. Then, an impression of the teeth will be made, and the veneers will be custom-made to fit the teeth. During the second appointment, the veneers will be bonded to the teeth using a special adhesive (7).

Lumineers are a brand of ultra-thin, custom-made dental veneers that are used to improve the appearance of teeth (8). They are made from a patented type of porcelain called Cerinate, which is extremely thin and strong (9). Lumineers are designed to be minimally invasive and require little to no preparation of the tooth surface, making them a popular choice for patients looking to improve the appearance of their teeth without extensive dental work (9).

Ceramic veneers are designed to improve the appearance of teeth that are discolored, misshapen, chipped, or otherwise aesthetically unappealing. Ceramic veneers are typically considered a more durable and long-lasting option than other types of veneers, such as composite resin veneers. They are also more resistant to staining and discoloration, and they have a natural, translucent appearance that mimics the look of natural teeth (9,10). This review aims to summarize the current literature on the influence of ceramic lumineers on inflammatory periodontal parameters.

Methods

Search strategy:

A comprehensive literature search was conducted using electronic databases such as PubMed, Embase, and Cochrane Library, to identify relevant studies published from January 2010 to September 2022. The following search terms were used: "ceramic veneers," "porcelain veneers," "dental veneers," "cosmetic dentistry," "tooth preparation," "bonding," "adhesive," "cementation," With the keywords of the “gingivitis”, “gingiva”, “periodontal”, “inflammation”. The search was limited to studies published in English.

Inclusion criteria:

Studies were included if they meet the following criteria: (1) they report on the use of ceramic veneers in humans; (2) they evaluate the outcomes of ceramic veneers, including inflammatory factors, incidence of periodontal diseases, and progression of periodontal diseases; (3) they have a sample size of at least 10 patients; (4) they have a follow-up period of at least 6 months; (5) they are published in peer-reviewed journals.

Exclusion criteria:

Studies will be excluded if they meet the following criteria: (1) they are animal studies or in vitro studies; (2) they evaluate other types of veneers, such as composite resin veneers; (3) they do not report on relevant outcomes; (4) they have a sample size of less than 10 patients; (5) they have a follow-up period of less than 6

months; (5) they are published in languages other than English.

Study selection:

Two independent reviewers screened the titles and abstracts of all identified articles to determine their relevance. Full-text articles were obtained for all potentially relevant studies, and two independent reviewers will assess them for inclusion based on the eligibility criteria. Any discrepancies will be resolved through discussion or consultation with a third reviewer if necessary.

Results

To have a proper illustration of the topic, we first need to know about the periodontal diseases. Periodontal disorders are conditions that affect the tissues surrounding and supporting the teeth, including the gums, periodontal ligament, and alveolar bone. There are several factors that can contribute to the development of periodontal disorders, including: poor oral hygiene, tobacco use, genetics, age, systemic diseases, hormonal changes, medications, nutritional deficiencies, stress, and malocclusion (11-13). Periodontal disorders involve inflammation of the tissues surrounding and supporting the teeth. Inflammation is the body's natural response to injury or infection, and it is an essential part of the healing process. However, if inflammation is not properly controlled, it can lead to tissue damage and disease (14-15). In periodontal disease, the inflammatory response is triggered by the presence of bacteria in dental plaque, a sticky film that forms on the teeth. As plaque accumulates, the bacteria produce toxins and other harmful substances that irritate the gums and cause them to become red, swollen, and tender. This early stage of periodontal disease is known as gingivitis (12-15). If left untreated, gingivitis can progress to periodontitis, a more severe form of periodontal disease. In periodontitis, the inflammation spreads from the gums to the ligaments and bone that support the teeth, causing them to become damaged and eventually leading to tooth loss (15). The inflammatory response in periodontal disease is characterized by the infiltration of immune cells, such as neutrophils and macrophages, into the affected tissues. These immune cells release inflammatory mediators, such as cytokines and prostaglandins, that contribute to tissue damage and bone loss (16,17).

There is limited research on the specific inflammatory factors in patients with veneers, especially the ceramic ones. However, several studies have evaluated the impact of veneers on overall oral health and inflammation (table 1). Alrahlah et al. study found that ceramic lumineers increased the levels of TNF-α in GCF after 24-week follow-up, which suggests an inflammatory response. However, periodontal parameters and GCF volume were comparable between the baselines and follow-up in patients treated with ceramic Lumineers (18).

Ariaans et al. (19) study found that all-ceramic restorations made from lithium disilicate and zirconia did not induce inflammatory reactions in periodontally healthy patients. No differences between the gingiva reactions of lithium disilicate and zirconia restorations could be shown.

Nejatidanesh et al. (20) study found that chair-side computer-aided design/computer-aided manufacturing ceramic laminate veneers were clinically successful restorations with a high survival and success rate after 5 years. The periodontal parameters were not changed after 5 years except plaque index (20).

Zhang et al. (21) study found that unprepared porcelain veneers had a higher diversity of microbial species in the gingival crevicular flora compared to the prepared group, which could suggest a potential association with inflammatory oral health.

Sanan et al. study compared two different methods of preparing teeth for veneer restorations in terms of their impact on

periodontal health. The group with feather edge vertical preparation with gingittage showed better results in terms of plaque index and bleeding index, indicating less inflammation in the surrounding tissue. However, there was no significant difference in gingival recession between the two groups. The study suggests that the feather edge vertical preparation with gingittage may lead to better long-term gingival health and esthetic outcomes for veneer restorations (22).

The preparation of the teeth for veneers may involve removing a small amount of enamel from the surface of the teeth, which can lead to some temporary sensitivity and irritation of the gums. Two study showed that different methods of preparation of the teeth for veneers may affect periodontal parameters (20,22). However, this is typically a minor and short-lived issue that can be managed with proper oral hygiene practices and over-the-counter pain relievers. It is important to note that while veneers do not cause inflammation themselves, maintaining good oral hygiene practices after their placement is essential to prevent the development of periodontal disease and other oral health issues. This includes regular brushing and flossing, as well as routine dental check-ups and cleanings. In cases where veneers are being used to improve the appearance of teeth that have been damaged or discolored due to periodontal disease, it is important to address and manage the underlying inflammation before proceeding with the placement of the veneers. This may involve treatment such as scaling and root planing, which removes plaque and tartar from the teeth and promotes healing of the gums.

Conclusion

The results suggest that ceramic lumineers have a limited impact on periodontal health, with no significant changes observed in measures of gingival inflammation or periodontal attachment levels. However, there are some concerns regarding the potential for plaque accumulation and difficulty in maintaining proper oral hygiene with lumineers. The literature also suggests that careful patient selection, adequate preparation, and appropriate cementation techniques are critical to minimizing any potential negative effects on periodontal health. While ceramic lumineers appear to have minimal impact on inflammatory periodontal parameters, more long-term studies are needed to fully understand their potential impact on periodontal health. Dentists should carefully consider patient selection and appropriate placement techniques to ensure the best possible outcomes.

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Tables

Table 1: characteristics of included studies

Study	Aim	Participants	Intervention	Outcome	Measures	Results
Alrahlah et al.	To evaluate the effect of ceramic lumineers on periodontal parameters, GCF flow rate, and cytokine profile	Patients with lumineers using standardized technique including minimal to no preparation	Patients with lumineers using standardized technique including minimal to no preparation	Ceramic lumineers etched with hydrofluoric acid and teeth with phosphoric acid followed by adhesive cementation	Periodontal parameters (Plaque index (PI), bleeding on probing (BOP), periodontal pocket depth (PPD), and clinical attachment loss (CAL)), GCF flow rate, and levels of IL-6 and TNF-α	Clinical periodontal parameters and GCF volume among patients treated with ceramic lumineers at baseline and twenty-four week follow-up were comparable. The GCF TNF-α levels significantly increased after ceramic lumineer cementation at 24-week follow-up.
Ariaans et al.	To quantify inflammatory reaction to ceramic restorations made from lithium disilicate and zirconia	Patients out of three prospective cohort-studies investigating three different all-ceramic restoration materials for crowns and fixed dental prostheses were included	All-ceramic restorations made from lithium disilicate and zirconia	Concentrations of IL1-beta, IL-1ra, and aMMP-8, as indicators of inflammation in the gingival crevicular fluid (GCF), periodontal status	Within the limitation of the study, treatment with all-ceramic restorations did not induce inflammatory reactions in a group of periodontal healthy patients. No differences between the gingiva reactions of lithium disilicate and zirconia restorations could be shown.	
Nejatidanesh et al.	To compare the survival, modified CDA criteria, and periodontal parameters of laminate veneers made with Empress CAD and emax CAD over 60 months	197 ceramic laminate veneers were placed in 71 patients in a private practice	Empress CAD and emax CAD blocks were used to create the restorations	Modified CDA guidelines, gingival and plaque indices, probing pocket depth, bleeding on probing, patient's satisfaction	Chair-side computer-aided design/computer-aided manufacturing ceramic laminate veneers were clinically successful restorations with mean survival rate of 99.0% and success rate of 96.4% after 5 years.	
Zhang et al.	To analyze the difference between prepared porcelain veneers and unprepared porcelain veneers on gingival	20 patients (40 anterior teeth) with veneer restoration of anterior teeth were enrolled	Prepared porcelain veneer group vs. unprepared porcelain veneer group	High-throughput sequencing	The gingival crevicular flora was significantly different between the two groups. The unprepared group had a higher diversity of microbial species compared to the prepared group.	

	crevicular flora				
Sanan et al.	compared two different methods of preparing teeth for veneer restorations	Patients with lumineers	feather edge vertical preparation with gingittage	Periodontal parameters	Method of preparing teeth for veneer bonding might also affect the periodontal parameters