


## RESTORATIONS WITH CERAMIC LAMINATES AND THE INDICATIONS AND CONTRAINDICATIONS OF THIS TREATMENT: LITERATURE REVIEW

 <https://doi.org/10.56238/arev6n2-119>

Submitted on: 11/09/2024

Publication date: 11/10/2024

**Rubens Monari de Queiroz Filho<sup>1</sup>, Ana Beatriz Cesnik<sup>2</sup>, Cláudio Alberto Franzin<sup>3</sup>, Lucimara Cheles da Silva Franzin<sup>4</sup>, Sandra de Oliveira Torchi<sup>5</sup> and Ilma Carla de Souza<sup>6</sup>**

### ABSTRACT

The search for restorations with ceramic laminates has been one of the main topics in dentistry today, since these restorations can reestablish aesthetics while having an extensive longevity. Therefore, ceramic laminates can positively influence the self-esteem of patients, promoting satisfaction in relation to their smile. The aim of this study was to review the literature, showing the indications and contraindications of restorations with ceramic laminates and the reasons that induce success or failure in this type of treatment, as well as its limitations. In view of the above, it is important to know the parameters to be evaluated before planning a treatment with ceramic laminates, in order to achieve clinical success.

**Keywords:** Dental laminates. Ceramic. Dental Aesthetics.

---

<sup>1</sup> Bachelor of Dentistry

Ingá University Center (UNINGÁ)

<sup>2</sup> Dentistry

Ingá University Center (UNINGÁ)

<sup>3</sup> Master's student in Dentistry

Ingá University Center (UNINGÁ)

<sup>4</sup> Post-Doctorate in Integrated Dentistry (UEM)

Adjunct Professor - Ingá University Center (UNINGÁ)

<sup>5</sup> Master in Orthodontics (UNINGÁ)

Adjunct Professor - Ingá University Center (UNINGÁ)

<sup>6</sup> Guidance counselor

Post-Doctorate in Integrated Dentistry (UEM)

Adjunct Professor - Ingá University Center (UNINGÁ)

## INTRODUCTION

The constant search for the improvement of aesthetics in Dentistry is one of the factors that most contributes to the elaboration and improvement of materials and techniques. Among the materials, ceramics are an excellent option in the search for naturalness, due to their ability to imitate dental tissues (AZER *et al.*, 2011; LEE; CHOI, 2018; MORIMOTO *et al.*, 2016).

As a result of this reality, among ceramic materials, laminates stand out for their aesthetics, color stability, and biocompatibility with periodontium. Therefore, they end up being the choice of many professionals and patients (MARCHIONATTI *et al.*, 2017).

The growing relevance of personal image in modern society makes the demand for this type of treatment increasingly common, since the smile is one of the first characteristics observed in interpersonal contact. In this way, the lack of harmony in the smile can directly affect people's self-esteem, causing aesthetic and, consequently, emotional problems. In this scenario, restorative treatment with ceramic laminates can directly interfere with patients' quality of life (MARTIN; CONCEIÇÃO *et al.*, 2007).

According to Hilgert (2009), when there is a need to change the color or shape of the buccal and incisal surfaces of anterior teeth and premolars, the use of ceramic laminates can provide the desired result, especially on darkened substrates; In this way, a balance can be achieved between the ability to mask the substrate and the final aesthetic result, increasing the thickness of the restoration, or using ceramics with greater opacity.

In this context, the objective of this integrative review is to highlight important aspects to be considered prior to the planning of treatment with ceramic laminates, emphasizing the indications and contraindications.

## METHODOLOGY

This is an integrative review (WHITTEMORE; KNAFL, 2005), which from the study of the literature aims to bring to light a particular subject (BROOME, 2000).

The data collection of this work was carried out from a selection of national and international articles. The search was carried out using the PubMed and Google Scholar platforms. In Portuguese and English, the descriptors used for the research were: dental laminates; Ceramics; Dental Aesthetics; Dental Veneers; Ceramics; Esthetics, Dental. The inclusion criteria established were: literature reviews, doctoral theses, and laboratory and clinical trial articles published between 2000 and 2022, with emphasis on works published

between 2010 and 2022. The exclusion criteria were: articles prior to 2000 and course completion papers.

## RESULTS

The development of materials that seek to preserve as much healthy dental tissue as possible and enlighten patients about the advantages of this preservation, has made ceramic laminates obtain great relevance in Dentistry. This is due to the possibility of performing esthetic restorations with less wear compared to total crowns (HILGERT, 2009).

In this way, the preparations are less invasive, aiming at the maintenance of the tooth structure, especially the enamel, since when adhesion is performed on this substrate, a more effective and long-lasting microretention is obtained. Therefore, it has been observed that enamel preservation significantly reduces the failure rate (BLUNCK *et al.*, 2020, GRESNIGT; ÖZCAN; KALK, 2011). Dentin exposure should be avoided, since the modulus of elasticity of this substrate is lower compared to that of porcelain, resulting in greater chances of fracture (CALAMIA; CALAMIA, 2007).

On the other hand, it is worth mentioning that the thickness of ceramic laminates is directly related to the ability to mask the substrate, that is, the greater the thickness, the greater the masking capacity. On the other hand, the thicker the material, the more invasive the preparation (ŞOİM *et al.*, 2018). It is also necessary to consider that the greater the thickness of the ceramic, the less color change caused by the resin cement (TURGUT; BAGIS, 2013).

Still with regard to this context, it is important to emphasize that, although ceramic laminates can be cemented in regions with the presence of aged resin, the degradation of polymers can impair the adhesion of resin cements on these surfaces. However, with the evolution of surface conditioning methods and bonding agents, it is possible to mitigate this factor (GRESNIGT; KALK; ÖZCAN, 2013, p. 824).

When considering these aspects, it is necessary to consider that the improvement of ceramic materials has made it possible to carry out increasingly satisfactory restorations. Understanding the particularities of each system enables the best option according to the clinical situation (TURGUT; BAGIS, 2013). Factors such as translucency, substrate color and the forces applied in the restoration region should be considered when choosing the system (LIM; YU; LEE, 2010). Among the systems commonly used for the manufacture of

ceramic laminates, we have conventional feldspar ceramics and reinforced vitreous ceramics (MORIMOTO *et al.*, 2016).

Conventional feldspar ceramic has excellent translucency, that is, it is ideal for cases where high characterization is required. However, the mechanical resistance of this system is low. Thus, conventional feldspar ceramic laminates are indicated in cases of less invasive preparations, with great aesthetic demand and where there is no need for flexural strength (PINI *et al.*, 2012).

On the other hand, reinforced vitreous ceramics have better mechanical properties compared to conventional feldspar ceramics. This is due to the increase in load particles that provide better resistance to fracture, bending and erosion. Charge particles also promote optical effects such as opacity and opalescence, however, these systems can be translucent, and the chemical composition and percentage of crystals will dictate the degree of opacity of the material. Therefore, reinforced vitreous ceramic laminates are indicated in cases where there is a greater need for masking and risk of bending (PINI *et al.*, 2012).

The interaction between the dental substrate, the ceramic and the cement will dictate the aesthetics of the treatment, that is, by modifying only one of these factors, the final result can be significantly altered (PORDEUS; BATISTA *et al.*, 2022) in addition, it is necessary to evaluate the patient's occlusal relations before treatment with ceramic laminates, both dynamic and static occlusion. If it is observed that the occlusion is not adequate, the malocclusion should be treated. It is also added that the treatment with ceramic laminates must include an anterior and lateral guide. (DA CUNHA *et al.*, 2014).

Furthermore, the condition of the periodontium should be investigated, as treatments with ceramic laminates should be performed in cases where periodontal health is present. It should be noted that if the patient has gingival health prior to treatment and the margins of the restorations have an adequate finish, ceramic laminates will cause minimal responses and in some cases, no response at all. If the interface between the cement and the filling is not adequate, periodontal tissues can be impaired. It is necessary to consider that the patient's oral hygiene after treatment also plays a fundamental role in the health of the periodontium (PEUMANS *et al.*, 2000; STRAZZI-SAHYON *et al.*, 2020).

Such considerations indicate that, in order to achieve success in the treatment, one must have knowledge about the factors that influence the result of restorations with ceramic laminates, as well as the indications and limitations of this type of procedure.

## **INDICATIONS**

### **STAINING AND DARKENING OF TEETH**

The use of ceramic laminates as a treatment for teeth with aesthetically unsatisfactory colors has been shown to be effective, however, it should be noted that ceramic laminates should be used in cases where in-office and home whitening do not present satisfactory performance (CHRISTENSEN, 2006). Severe darkening due to the use of tetracycline, for example, is a condition that illustrates these circumstances well and is commonly treated with ceramic laminates (FAUS-MATOSSES *et al.*, 2017).

### **DIASTEMA**

Diastema is a spacing between the teeth, with no point of contact between them. Diastemas can compromise the aesthetics of the smile, especially in the upper teeth (LEVY-BERCOWSKI; ABREU, 2019). Ceramic laminates are among the possibilities for the treatment of diastemas (DA CUNHA *et al.*, 2014).

### **DENTAL ANATOMY**

Treatment with ceramic laminates can be performed in order to change the shape, contour, volume and size of the teeth (PINI *et al.*, 2012). It is important to emphasize that the aesthetic impairment in some patients is due to too much gingival exposure and, therefore, gingival plastic surgery should be considered as a possibility of treatment (CHRISTENSEN, 2006).

## **CONTRAINDICATIONS**

### **GREAT CORONARY DESTRUCTION**

A large coronary destruction prevents the treatment with ceramic laminates from being carried out properly, because in addition to needing a large surface due to the reduced thickness, the ceramic laminates must be cemented, ideally, to the enamel. Therefore, when this substrate is insufficient, the success rate decreases significantly (BLUNCK *et al.*, 2020; GRESNIGT; KALK; ÖZCAN, 2013; PINI *et al.*, 2012).

### **EXTENSIVE RESTORATIONS**

The importance of having a considerable amount of enamel as a substrate for treatment with ceramic laminates makes extensive restorations unsuitable for this type of

restoration. Thus, in these cases, treatment with total crowns should be considered (BLUNCK *et al.*, 2020; CHRISTENSEN, 2006).

## MALOCCLUSION

Occlusal problems are among the factors that most increase the chances of treatment failure with ceramic laminates. Therefore, the patient must have an ideal occlusion (DA CUNHA *et al.*, 2014; LI *et al.*, 2014). It is worth mentioning that, in some cases, orthodontic treatment can establish satisfactory aesthetics, and treatment with ceramic laminates is not necessary (CHRISTENSEN, 2006).

## PERIODONTAL DISEASE

Periodontal condition is a determining factor in the long-term success of treatment with ceramic laminates. Before any restorative procedure, it is essential to have periodontal health (DA CUNHA *et al.*, 2014).

## BRUSSELS

The probability of fracture and detachment of ceramic laminates in patients with bruxism is significantly higher compared to patients who do not have this parafunctional habit. However, it was found that the use of myorelaxant plaques can reduce the failure rate of this treatment. That said, when bruxism is suspected, the patient should be advised to use this device (GRANELL-RUÍZ *et al.*, 2014).

## DISCUSSION

Restorations with ceramic laminates, as they denote minimally invasive preparations, are a very conservative treatment possibility, restoring aesthetics and function, thus it is a treatment option considered successful (DA CUNHA *et al.*, 2014).

Beier *et al.* (2010) observed 152 restorations with ceramic laminates for 10 years and reported that the survival rate was 93.5%. The main reason for treatment failures was ceramic fractures, which corresponded to 44% of failures. Another relevant data observed was that bruxism increased the risk of failure by 7 times. It is also noteworthy that marginal discolorations were frequently more observed in smoking patients, in addition, the restorations were performed by experienced professionals, who respected the ideal occlusal parameters, and the patients were in periodontal health. (BEIER *et al.*, 2010).

Another study, which followed 323 restorations with ceramic laminates over a period of 3 to 11 years, found fracture in only 4% of cases and a subtle marginal pigmentation in 39.3% of cases. It is interesting to note that 97.1% of the patients considered the result satisfactory and 98% of the cases had marginal integrity (GRANELL-RUIZ *et al.*, 2010).

It is then observed that among the factors that gave so much prominence to the treatment with ceramic laminates, longevity is one of the most relevant, however, in order to be successful in the long term, a plan must be prepared, respecting the indications (PINI *et al.*, 2012; SHONO; NAHEDH, 2012).

Still, even with the remarkable longevity achieved in the treatment with ceramic laminates, the oral cavity is a hostile environment, that is, dental materials will suffer effects such as fatigue and degradation. These harms will inevitably cause the aging of materials (GRESNIGT; KALK; OZCAN, 2013).

Restorations with ceramic laminates should be performed with common sense, observing the contraindications of the treatment. The professional must follow the research to be aware of the innovations in the techniques and materials used, always aiming at the improvement of treatments and the well-being of patients.

## **CONCLUSION**

Ceramic laminates provide excellent results, as they represent a predictable, conservative and long-lasting treatment. Their ability to restore the aesthetics and function of the teeth makes these restorations often the option chosen as a therapeutic option. However, it is crucial that the professional has knowledge about the indications, limitations and factors that influence the outcome of the treatment.

## REFERENCES

1. Azer, S. S., et al. (2011). Effect of substrate shades on the color of ceramic laminate veneers. *\*Journal of Prosthetic Dentistry*, 106\*(3), 179–183.
2. Beier, U. S., et al. (2010). Clinical performance of porcelain laminate veneers for up to 20 years. *\*The International Journal of Prosthodontics\**.
3. Blunck, U., et al. (2020). Ceramic laminate veneers: effect of preparation design and ceramic thickness on fracture resistance and marginal quality in vitro. *\*Clinical Oral Investigations*, 24\*(8), 2745–2754.
4. Broome, M. E., et al. (2000). Integrative literature reviews for the development of concepts. In *\*Concept development in nursing: foundations, techniques and applications\** (pp. 231-250). Philadelphia, PA: WB Saunders Company.
5. Calamia, J. R., & Calamia, C. S. (2007). Porcelain Laminate Veneers: Reasons for 25 Years of Success. *\*Dental Clinics of North America\**.
6. Christensen, G. J. (2006). Are veneers conservative treatment? *\*Journal of the American Dental Association*, 137\*(12), 1721–1723.
7. Da Cunha, L. F., et al. (2014). Esthetic, occlusal, and periodontal rehabilitation of anterior teeth with minimum thickness porcelain laminate veneers. *\*Journal of Prosthetic Dentistry*, 112\*(6), 1315–1318.
8. Faus-Matoses, V., et al. (2017). Severe tetracycline dental discoloration: Restoration with conventional feldspathic ceramic veneers. A clinical report. *\*Journal of Clinical and Experimental Dentistry*, 9\*(11), e1379–e1382.
9. Granell-Ruiz, M., et al. (2010). A clinical longitudinal study 323 porcelain laminate veneers. Period of study from 3 to 11 years. *\*Medicina Oral, Patologia Oral y Cirugia Bucal*, 15\*(3).
10. Granell-Ruiz, M., et al. (2014). Influence of bruxism on survival of porcelain laminate veneers. *\*Medicina Oral Patologia Oral y Cirugia Bucal*, 19\*(5), e426–e432.
11. Gresnigt, M. M., et al. (2013). Randomized clinical trial of indirect resin composite and ceramic veneers: up to 3-year follow-up. *\*The Journal of Adhesive Dentistry*, 15\*(2), 181–190.
12. Gresnigt, M. M. M., Kalk, W., & Özcan, M. (2013). Clinical longevity of ceramic laminate veneers bonded to teeth with and without existing composite restorations up to 40 months. *\*Clinical Oral Investigations*, 17\*(3), 823–832.
13. Gresnigt, M., Özcan, M., & Kalk, W. (2011). Esthetic Rehabilitation of Worn Anterior Teeth with Thin Porcelain Laminate Veneers. *\*The European Journal of Esthetic Dentistry*, 6\*(3), 298–313.



14. Hilgert, L. A. (2009). Influência da Cor do Substrato, Espessura e Translucidez da Cerâmica na cor final de facetas laminadas produzidas com o Sistema CEREC InLab. (Doctoral dissertation, UFSC). Florianópolis: UFSC.
15. Lee, S. M., & Choi, Y. S. (2018). Effect of ceramic material and resin cement systems on the color stability of laminate veneers after accelerated aging. *\*Journal of Prosthetic Dentistry*, 120\*(1), 99–106.
16. Levy-Bercowski, D., & Abreu, A. (2019). Midline diastema closure using a vacuum-formed retainer. *\*Journal of Prosthetic Dentistry*, 121\*(1), 183–184.
17. Li, Z., et al. (2014). A three-dimensional finite element study on anterior laminate veneers with different incisal preparations. *\*Journal of Prosthetic Dentistry*, 112\*(2), 325–333.
18. Lim, H. N., Yu, B., & Lee, Y. K. (2010). Spectroradiometric and spectrophotometric translucency of ceramic materials. *\*Journal of Prosthetic Dentistry*, 104\*(4), 239–246.
19. Marchionatti, A. M. E., et al. (2017). Color stability of ceramic laminate veneers cemented with light-polymerizing and dual-polymerizing luting agent: A split-mouth randomized clinical trial. *\*Journal of Prosthetic Dentistry*, 118\*(5), 604–610.
20. Martin, A. J., et al. (2007). The impact of buccal corridors on smile attractiveness. *\*European Journal of Orthodontics*, 29\*(5), 530–537.
21. Morimoto, S., et al. (2016). Main Clinical Outcomes of Feldspathic Porcelain and Glass-Ceramic Laminate Veneers: A Systematic Review and Meta-Analysis of Survival and Complication Rates. *\*The International Journal of Prosthodontics*, 29\*(1), 38–49.
22. Peumans, M., et al. (2000). Porcelain veneers: a review of the literature. *\*Journal of Dentistry*, 28\*(3), 163–177.
23. Pini, N., et al. (2012). Advances in dental veneers: materials, applications, and techniques. *\*Clinical, Cosmetic and Investigational Dentistry*,\* 9.
24. Pordeus Batista, L. A., et al. (2022). Color alteration with ceramic veneers according to the tooth type and preparation step: A clinical analysis. *\*The Journal of Prosthetic Dentistry*,\* July 15.
25. Shono, N. N., & Al Nahedh, H. N. A. (2012). Contrast ratio and masking ability of three ceramic veneering materials. *\*Operative Dentistry*, 37\*(4), 406–416.
26. Şoim, A., et al. (2018). Translucency and masking properties of two ceramic materials for heat-press technology. *\*Journal of Esthetic and Restorative Dentistry*, 30\*(2), E18–E23.
27. Strazzi-Sahyon, H. B., et al. (2020). Role of adhesive systems on the luting interface's thickness of ceramic laminate veneers. *\*Brazilian Oral Research*, 34.\*

28. Turgut, S., & Bagis, B. (2013). Effect of resin cement and ceramic thickness on final color of laminate veneers: An in vitro study. \*Journal of Prosthetic Dentistry, 109\*(3), 179–186.
29. Whittemore, R., & Knafl, K. (2005). The integrative review: updated methodology. \*Journal of Advanced Nursing, 52\*(5), 546–553.