# DENTAL CERAMIC LAMINATES: CURRENT APPROACH FOR REHABILITATION

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## ABSTRACT

The constant search for a harmonious and aesthetic smile elevates the level of demand and expectation of patients. This fact favors the development of new materials and techniques in dentistry, aiming for more conservative procedures and results that are increasingly aesthetically predictable. An example of such more conservative procedures are ceramic laminates, which are ultra thin porcelain veneers up to 0.3 mm thick that are applied to the surface of the tooth, optimizing their shape, color, function and other factors. This paper aims to present a literature review on the subject, in order to describe what is most current in the literature on ceramic laminates.

**KEYWORDS:** Esthetics, dental veneers, ceramics.

## 1. INTRODUCTION

Minimally invasive preparations have gained prestige in current restorative dentistry because they enable highly aesthetic results, with good preservation of dental tissue and excellent results in the long term. Such prestige was won not only among professionals in the field, but also among patients, who are increasingly looking for aesthetic solutions to their smile[1,2].

Ceramics are materials with high resistance to staining and wear, and have proven biocompatibility. However, its laboratory procedures for making ceramic restorations require differentiated experience, technique, materials and equipment, significantly increasing the cost[2,3].

The search for restorations that are increasingly mechanically and optically similar to dental structures led to the development of new ceramic systems with the addition of crystals and reinforcing oxides. This fact, provided better mechanical properties to the material, enabling the production of thinner ceramic laminates which favors less invasive wear, with high aesthetics and greater resistance[4].

As the use of ceramic materials provides little or in some cases even no wear of healthy dental structures, this rehabilitation technique has been indicated in a large part of the rehabilitations[5].

The clinical use of ceramics has been consecrated by several properties that resemble natural teeth, such as color stability, fluorescence, biocompatibility, chemical stability, high compressive strength and coefficient of thermal expansion similar to tooth structure, resulting in longevity for the restorative treatment. However, the clinical success of ceramic restorations depends, moreover, on the characterization of the surface, color, marginal integrity, anatomical shape and the combination of the final color of the ceramic restorations with the cement and with the structure below the restoration, whether natural tooth, metal core, implant prosthetic abutment, or even a composite resin fill core[6-8].

The facet consists of the covering of the vestibular face of the dental enamel by a restorative material, strongly attached to the dental element through the recent advances of the adhesive systems and can be made by the direct technique (composite resin) or indirect (ceramic)[6-9].

Dental "contact lenses" are ultrathin porcelain veneers up to a maximum of 0.3 mm thick that are applied to the tooth surface. They were so called because the thickness is comparable to that of ocular contact lenses. The "contact lenses" are indicated for the following situations: reanatomize anterior teeth, make expulsive teeth, lingual and small teeth, restore vestibular volume, small color change, mask class III, IV and V restorations, diastema closure, restore edge incisal flap, correcting misalignment and anterior tooth rotation and covering porcelain or metal ceramic restorations. The aesthetic restoration of the patients is of extreme importance, however the restoration of the function is also essential for the success of any restorative treatment, in both anterior and posterior teeth[2-10].

Dental preparations for facets, when compared to preparations for total crowns, are more conservative. In this way, the classic dental preparations became atypical, more conservative and reversible[9,11].

The concept of Restorative Dentistry now advocates that for any type of procedure, the professional should always choose the most conservative treatment, that is, with greater preservation of healthy dental structure. The treatment plan must be carried out in a way that allows a good prognosis to be formulated in the medium and long term, not only in terms of aesthetics, but also considering the biological and functional aspects[10,12].

Appearance in the present times has become necessary and implies the patient's self-esteem and well-being. Aesthetics today in modern society is a prime

factor. The beauty of the smile and face as a whole is related to the good coexistence of the individual in society. Being able to affirm that a harmonious smile is of extreme importance for the beauty and personal satisfaction. Given this, dentistry has been improving more and more to seek patient satisfaction, returning an aesthetic and functional smile. This is only possible due to the advancement of dental materials, which allows us to reproduce more accurately the natural characteristics of dental structures[11,13].

Based on the adhesive techniques and the parameters of conservation of dental structure, this work aims to review a rehabilitation protocol for the realization of ceramic laminates, as well as a literature review on the subject.

## 2. MATERIAL AND METHODS

A bibliographic search was performed in the search databases carried out at the Virtual Health Library (VHL), Latin American Literature in Health Sciences (Lilacs) and Scientific Electronic Library Online (Scielo), referring to works from the year 2006 to 2017, using as descriptors: aesthetics, ceramic laminates, ceramics, esthetics, dental veneers and ceramics. The selected articles were organized in an exploratory way whenever they were related to the proposed theme.

## 3. DISCUSSION

Ceramic laminates in recent years have been widely used for aesthetics. Although this approach is one of the most conservative treatments, some rules should be followed as, the need for excellent communication between the dentist, patient and ceramist. The case must be carefully selected and the treatment planned for the success of the final result. To facilitate communication and guarantee success in the final result, it is essential to obtain study models, diagnostic waxing and photographs, thus guaranteeing a prior evaluation of the work to be performed and making possible greater patient participation in the treatment[2,14].

Ceramics reinforced with Lithium disilicate have a glassy matrix in which the crystals of this substance are dispersed in interlaced form, making it difficult to propagate cracks inside. This system has a high aesthetic standard, due to the light refraction index similar to dental enamel, without significant interference of translucency, allowing the possibility of reproducing the natural structure of the dental structure. Likewise, crystal size and arrangement favor higher mechanical strength and wear for restoration. On the other hand, the evolution of resinous cementitious agents allowed a union quality, eliminating the conditioning and hybridization stages of the dentin structure[4,5,7,10,15].

Another important aspect is the use of addition silicone molding material, as well as providing a more detailed copy allows the model to be manufactured within seven days without compromising mold fidelity, as well as providing multiple models, a factor that is directly related to the success of the laboratory stages and also allows the clinician to work with dental laboratories in other regions[2,5,8,11-16].

Physical activation cements have been considered as a choice option because the chemically activated or double activation cements have in their composition tertiary amine and benzoyl peroxide as a chemical activator, which can cause color changes over time and compromise the final aesthetic result. The use of exclusively physical activation cements is fundamental for maintaining the aesthetics and color stability of ceramic laminates. This is because the small thickness of these types of restorations does not allow to mask possible color changes that can occur in the cements that have chemical activation, since the laminates are very translucent[17].

Resin cements feature various color and opacity options. These options are important for ceramic laminates, because the color of the cement used may have some effect on the final aesthetic result, especially when the ceramics of choice have high translucency. Regarding the choice of cement resins, the literature suggests the use of photoactivated cements[2-6,7,8,13-20].

In order to perform the ceramic facets, it is essential to obey a predictable protocol by performing previous procedures such as extra and intraoral photographs, radiographic examinations, obtaining study models, face and smile measurements for determination of the ideal width dimensions and length of teeth. These new measurements are transferred with a temporary material to the patient's mouth, remaining for up to two weeks. In this period, the patient can check the accommodation with proposed aesthetic planning and also suggest small modifications to improve the final result. This procedure is called restorative or mock-up test and allows the clarification of doubts. After approval of the mock-up, the execution of the ceramic facets includes a clinical session for preparation, molding and placement of temporary and a second session for cementing the ceramic facets[6-10,14-20].

It is important to emphasize the care we must take when removing excess cement after insertion, thus ensuring dental and periodontal health, thus increasing the longevity of the ceramics and the final aesthetics of the smile[3,4,9,14,19-21].

Before a critical moment of decision, as before the cementation of ceramic laminates, and the photographs can aid in the decision making about the color and shape of the prosthetic pieces. By observing the images, the patient can have a clearer opinion about what changes are necessary. It can be an excellent means of communication with the prosthetic laboratory, in which it allows the ceramist to have a visualization of the face, the smile and the lip contour of the patient, favoring the making of customized restorations and some specific photographs may be important in the ceramic corrections to be made[10,21].

The selection of the types of techniques to be used in oral rehabilitation, as well as the association between them depends on several factors, among them, professional ability, the patient's desire, knowing the

advantages and disadvantages of each technique, cost, degree of aesthetic requirement, among others. It is important that the professional knows the properties of different materials used in oral rehabilitations, so that they can be safely indicated and performed according to the correct clinical principles[8,14,16,21].

The final aesthetic success of the restorations is dependent on a combination of colors between the dental substrate, the cementing agent and the restorative material[1,8,15].

The adjustment of the occlusion in the Maximum Habitual Intersection, performed after cementation of the restorations should be performed in a judicious manner, and also the excursion movements of protrusion and laterality. This type of evaluation is important insofar as the success of the treatment is related to factors related to the patient, such as oral hygiene and feeding habits and factors related to the treatment plan, including occlusal adjustment and correct use of techniques and materials[4,8,9,13].

In an aesthetic analysis of anterior teeth there is much information to be observed, which can hardly be noted during the first clinical visit. Obtaining photographs at different angles can help the professional to analyze aesthetic details in the absence of the patient. In addition to assembling the initial treatment plan, photographs may be useful for several other situations. It is a very interesting way of transmitting to the patient, information about the clinical problems encountered, being able to enlarge the images for a better visualization[10,18].

For dental procedures such as facets, temporary restorative materials are essential, as they will protect the dental tissues from the conditions present inside the oral cavity, helping to stabilize the prepared teeth while the final restoration is being made, being ideal for the election of the form of contour and color of the final restoration[15]. Such temporary restorative materials may be thermoplastic acrylics (acrylic resin) or the provisional bisacrylic resins. Acrylic resins because they have the mechanical and physical requirements that are resistance to wear, flexure and fracture in addition to reasonable color stability and handling properties, have been widely used as temporary material, but the provisional bisacrylic resins have better mechanical properties, greater ease of handling and better aesthetic results, has become increasingly popular[4,7,12.16,18,20,21].

The ceramic laminates allow a minimally invasive preparation, with greater preservation of healthy dental structure with less sensitivity, when compared to other conventional techniques, being a safe alternative of treatment when one has training and knowledge of the technique. When compared to other restorative materials, the laminates offer a better prognosis, with less abrasive restorations and more fracture resistant, due to the size and distribution of the particles, having a better coefficient of thermal expansion. Such characteristics make the ceramic a material superior to the composite resin, in addition to its resistance to wear, it also has a color stability, surface smoothness and is biocompatible. For all these characteristics, the laminates present a higher cost when compared to the direct restorations of composite resin, however, it presents a longer life time, thus balancing the cost X benefit. Since the preparation of ceramic laminates is more efficient, conservative and safe, follow-up studies show a satisfactory survival rate, with a success rate of 96% after 5 years and 94.4% after 12 years[11].

In a literature review study on laminated facet faults, planning was found to be critical, but the longest failure rates are related to failures in dental preparation, field insulation, or part cementation. It is observed that although the composite resin is a very judicious material at the time of the restorations, the ceramic also requires a lot of skill for the preparation and also at the moment of cementation. It is up to the dental surgeon to clarify to the patient the clinical indications and let him reflect on the choice of the material. The most expensive material is not always the most suitable, however the expectation regarding color and frequency of maintenance need to be considered[13].

For the surface treatment of ceramics, several methods have been reported, most notably hydrofluoric acid, silanization, aluminum oxide blasting, diamond particles or silica-coated aluminum oxide. The use of silane is an essential step to promote chemical bonding with the resin cement and the surface of the conditioned ceramic restorations by means of silica present therein. For ceramics based on zirconia the conditioning of the inner surface of the piece with hydrofluoric acid is not the most appropriate. Many treatments are suggested, with aluminum oxide sandblasting being one of the most popular. The aluminum oxide sandblasting aims to increase the roughness of the zirconia, creating micro retentions and increasing the area of contact with the cement[14].

Ceramics are dental materials already consecrated in oral aesthetic rehabilitation for the excellent results that can be obtained. Obviously, for clinical success to be achieved, not only with ceramics but also with all restorative dental materials, it is imperative that accurate planning be done with a correct indication and an effective technique[15].

## 4. CONCLUSION

It was concluded that the establishment of a clinical protocol is of fundamental importance to help us to make aesthetic work performed in the anterior region quite predictable, thus reaching the expectations of the patient. When possible, ceramic laminates can and should be used in isolation or in association with other specialties; thus restoring aesthetics, phonetics and function of the anterior teeth.

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