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The advancement of adhesive dentistry with the endocrown technique and its diffusion among professionals: a literature review

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Abstract

Introduction: In the decades with the advancement of materials fabrication, such as restorations with the latest improvements in their dental fabrication process, or as restorations with improvements in their dental fabrication process, or as the latest restorations in their dental fabrication process, dentistry, or as the latest restorations in their restorative materials manufacturing process. **Objective:** This work aims to demonstrate through a literature review the use of the endocrown technique. **Methods:** The research was carried out from January to May 2022 and was developed based on PubMed, Scielo, and Google Scholar. **Results:** There were 11 a total of 13 articles on Endocrowns. In total, 47 articles were complete and 19 were included in this study. Dentistry, contributing to a better resolution of cases, presents little interocclusal space, so the indirect endocrown restoration technique becomes an excellent option, presenting a good alternative and less dental wear for making. **Conclusion:** It was concluded that the use of the endocrown technique has shown, for the most part, employing clinical results that it is an excellent restorative option for the restoration of molars with great coronary destruction, and its clinical survival rate was comparable to the use of intraradicular posts of fiber.

Keywords: Dental care. Endocrown technique. Intraradicular Pins. Adhesive Dentistry.

Introduction

In recent decades, the advancement of adhesive dentistry, along with improvements in the properties of restorative materials and their manufacturing process, has allowed restorations to recover all or part of the weakened strength of the tooth, thus increasing the possibility of more conservative and restorative procedures less invasive procedures that always seek the preservation of the dental structure and greater preservation of the treatment [1].

Conventionally, restoration of severely compromised teeth, and with endodontic treatment, occurs through conventional crowns associated with posts and cores. However, it is currently known that with the removal of the pulp tissue, dentin dehydration occurs, associated with changes in its mechanical properties, making the dentin more friable and susceptible to fractures. This factor is exacerbated when considering the presence of metallic cores. However, with the advancement of adhesive dentistry, a new, more conservative restoration method ended up becoming a viable treatment alternative to the conventional post/crown, called endocrown [2].

The term endocrown was first described by Bindl and Mörmann (1999), as an adhesive endodontic crown and is characterized as a full porcelain crown that is fixed on posterior teeth with pulps removed [3]. Endocrowns are one-piece ceramic restorations in which there is macro mechanical retention caused by anchoring in the inner wall of the pulp chamber and micromechanical retention by adhesive cementation [4].

In addition to removing lower amounts of healthy tissue and presenting a shorter clinical time for its manufacture compared to other techniques, such as intra radicular fiber posts, which need a greater removal of healthy tissue for its adaptation and a greater clinical time for preparation [5].

The greater the depth of the pulp chamber cavity, the greater the contact of the piece with the side walls, causing greater adhesive retention and consequently

resulting in better stability and distribution of masticatory forces, providing an adhesion without aggressive interventions to the dental tissues. Endocrowns are indicated for limited interocclusal spaces, where it is not possible to achieve a sufficient thickness of the ceramic coating on the metal or ceramic structures, and maybe a solution in cases of small, obliterated, torn, or fragile roots, as in these situations it would be more difficult to use of an intraradicular retainer [6].

Despite not being a new concept, the use of endocrowns is still not a common procedure for general dentists, and the concepts, indications, and techniques are little known. Thus, this article aimed to describe the endocrown technique through a clinical case and address the important aspects of the technique, enabling its dissemination and use.

Methods

The work in question was developed with acquired knowledge and is available in the vast literature, where the collection and compilation of extracted from databases, public and private, such as by data, Scielo, PubMed and Google Scholar was carried out. Selected articles related to the proposed theme were not temporal parameters for research. For this research, it was used the following descriptors, to facilitate the direct search for the topic: *Endowns; Intraradicular Pins; and Adhesive Dentistry*.

Literature review

One of the main goals of cavity preparation is the preservation of dental tissue. The endocrown technique strictly follows this reasoning. This type of preparation consists of a circumferential edge margin of 1.0 to 1.2 mm, and a central retention cavity inside the pulp chamber, transforming the crown and core into a single unit [7].

In a clinical case presented by GT Rocca et al, it was shown that when there is a large amount of dental tissue lost due to pathology or endodontic treatment, the use of an endocrown restoration instead of other techniques was justified because this technique allows the conservation of the sound dentin and peripheral enamel. In addition to not having to perform the typical preparation for the placement of intraradicular posts [8].

Over the years, publications such as the one by Yasmin Elashmawy et al appeared, which evaluated the retention of endocrowns made of different materials. The results showed that lithium disilicate glass ceramics and resin-infiltrated ceramics recorded considerably higher retention values, while the use of zirconia obtained a favorable failure that avoided possible tooth fracture [9].

An *in vitro* study by Gr Biacchi compared the fracture strength of conventional crowns with those retained in fiberglass posts. The study was performed with 20 healthy lower molars that were subjected to an oblique compression load, at an angle of 135 degrees to the long axis of the tooth, until failure. Concluding then that the endocrowns present a greater resistance to the fracture when compared with the conventional crowns of crown/Fiber Post [10].

Li et al, analyzing the biomechanics of endocrowns with fiberglass crown/post restorations in maxillary central incisors, found that endocrown depth does not significantly influence stress distributions, so 3mm was considered the ideal depth for the endocrown [11]. Borges Junior et al, in their study comparing zinc phosphate, glass ionomer, and dual resin cement for endocrown cementation. He found in his study that there was no statistical difference between the types of cement in the tensile strength tests [12].

While Hassouneh et al evaluated whether it is feasible to use endocrowns in endodontically treated premolars. It concluded that composite resin endocrowns are a reliable option for restoring premolars [13]. Guo, Jing, et al, performed an analysis regarding the use of endocrowns in lower premolars and concluded that endocrowns do not present advantages to fractures compared to the conventional pin/crown technique [14].

In a 2017 literature review, it was found that fiberglass posts are more susceptible to loss of post/crown retention [15]. Regarding the extension of the endocrown preparation, which was put into practice by Dartora et al, the study concluded that endocrown restorations 5 mm deep in the pulp chamber present a better mechanical performance in the distribution of forces compared to the preparation of 1 mm in length [16].

Discussion

The preparation for an endocrown crown follows the same pattern and principles as the preparation for indirect restorations such as inlay and on lay, that is, presenting slightly expulsive axial walls (12 degrees), rounded internal angles, and straight pulp chamber floor. The only difference is that the cave surface angle is not the limit of the preparation, but the pulp chamber and its rounding are indicated [17].

Authors such as Vinola et al, consider that the fabrication of endocrown is more practical and less complex when compared to conventional crowns with a filling core, but the success and longevity of this restoration will depend on the skill of the operator, preparation technique, ceramic selection and cementing

material [18].

Post and core restoration can further weaken the roots when the roots are considerably short, destroyed, damaged, or weakened. However, endocrowns cannot be indicated if the pulp chamber depth is not greater than 3mm and if the peripheral wall thickness is less than 2mm. In conventional restorations, there is a risk of perforating the root during the root canal of obturation, whereas this risk does not exist with endocrowns. Endocrowns have fewer adhesive interfaces compared to conventional restorations, root posts have two interfaces, while endocrowns have only one. This makes it less susceptible to the effects of hybrid layer deterioration [19].

According to Borges et al, the type of material used should be considered one of the main focuses for making the endocrown, as well as cementing to ensure good adhesion. Zinc phosphate, glass ionomer, and dual resin were subjected to a traction test to test the strength of each one, in prostheses made of acrylic resin and cemented in bovine teeth already prepared. Dual resin cement and zinc phosphate showed the best results, concluding that cementing endocrowns with conventional types of cement can be considered a valid option [12].

A study by Mai Soliman reveals that (63.16%) of dentists in Riyadh, Saudi Arabia use endocrown as the treatment of choice to restore endodontically treated teeth. Already 40.35% preferred endocrown for patients with parafunctional habits such as bruxism [2]. Several materials can be used to make endocrowns, such as reinforced glass-ceramic, feldspathic porcelain, hybrid composite, CAD/CAM ceramic, or composite blocks.

The scientific literature is still unclear about which material is most suitable for these types of restorations. However, CAD/CAM resin blocks can be used instead of classic lab-made restorations to avoid defects referring to the freehand lab technique and thus improve mechanical properties [8].

Conclusion

It was concluded that the use of the endocrown technique has shown, for the most part, employing clinical results that it is an excellent restorative option for the restoration of molars with great coronary destruction, and its clinical survival rate was comparable to the use of intraradicular posts of fiber.

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Conflict of interest

The authors declare no conflict of interest.

Similarity check

It was applied by Ithenticate@.

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