Minimally Invasive Restoration of Endodontically Treated Molars

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Abstract: The restoration of the endodontically treated tooth is a widely debated topic in the literature and has been for many years. The criteria studied are many and the analytical methods are varied. Indeed, the “gold standard” is to choose the technique that offers the least invasive preparation with maximum dental tissue preservation and improved retention and resistance to fracture. The endocrowns could be an alternative to restore teeth posterior endodontically treated teeth. Therefore, the present article describes a case report of restoration of a non-vital lower molar endocrown.

Keywords: endodontically treated tooth, molars, endocrown, CAD/CAM technique

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I. Introduction

Compared to vital teeth, fracture risk of endodontically treated teeth is higher because of loss of structural integrity associated with dental caries, access cavity preparation, and root canal preparation rather than changes in dentin. With the development of adhesive systems, the need for post-core restoration is reduced. Especially for restoration of excessively damaged endodontically treated molars, endocrowns have been used as an alternative to the conventional post-core and fixed partial dentures. It consists of one ceramic crown fixed to an endodontically treated posteriortooth, which is anchored to the internal portion of the pulp chamber and to the cavity margins, thus obtaining micromechanical retention (provided by the pulp walls), and microretention (by using adhesive cementation). In addition, endocrown presents greater fracture strength than conventional crowns.

However, the success and longevity of the endocrowns are directly related to tooth selection, correct preparation of the tooth, the selection of the most suitable ceramic options, and the choice of bonding material, since adequate adhesive cementation is absolutely necessary for the success of this restorative treatment (5).

Case Presentation

A 40-year-old female patient was referred to our department for restoring her first left mandibular molar. Clinical examination showed a damaged molar with a defective amalgam restoration (Figure 1). Periapical radiograph showed an incomplete endodontic fitting of the apical third of the mesial root due to the presence of a fractured file (Figure 2). We tried to remove the fractured instrument during the endodontic retreatment. Unfortunately, we failed since the instrument was in the apical third of the root. Since the tooth didn’t show any clinical symptomatology, endocrown restoration was recommended. All the unsatisfactory restorative amalgam was removed from tooth #36. The canal entrances were sealed with conventional, chemically activated glass ionomer cement. The preparation consisted of a cervical margin in the form of a butt joint and a central retention cavity into the entire pulp chamber constructing both the crown and the core as a single unit. The apertura reduction of the buccal and lingual walls was done. Interocclusal space was carefully evaluated and occlusal reduction done to achieve a clearance of 2 mm (Figure 3). A provisional endocrown was performed using polymethacrylate cemented with eugenol-free temporary cement (Figure 4). The impression was made with polyvinyl siloxane. The endocrown was manufactured in the laboratory via indirect CAD/CAM technique. A lithium-disilicate blocks was chosen because of its sufficient fracture resistance value (Figure 5).

The patient returned for a try-in of the crown and to test the internal and proximal adjustments, prosthetic retention and the esthetic result. For cementation, the external cervical margin of the crown was protected with wax and then etched with 10% hydrofluoric acid for 20 seconds, then washed and dried. Silane was applied and dried. After that, the tooth was isolated (Figure 6) and treated with 37% phosphoric acid for 30 seconds, then thoroughly rinsed and dried.

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Bonding was performed using a dual curing self-adhesive permanent resin (TOTALCEM ®). A thin layer was applied to the prosthetic endocrown, which was positioned, and polymerized at intervals of 5 seconds on the free surfaces, making it easy to remove cement excesses. Afterwards it was polymerized for 60 seconds on all surfaces (Figure 7). Then, occlusion contact was checked in order to have no area contact when dynamic occlusion. If there is contact, rectifications must be followed by a polishing.
II. Discussion

Endocrowns do not need peripheral tooth preparation; it’s a good treatment that preserves dental tissue. For preparation, the axial height is reduced at least two millimeters. These two millimeters must always be checked in occlusion. This makes it possible to take into account the occlusal relationship between the prepared tooth and the antagonists. The groove on the buccal wall is dictated by the location of the amalgam and avoids extra mutilation with excessive occlusal reduction. The depth of the cameral chambers should be at least three millimeters, with a divergence of the walls of eight to ten degrees.

There Are Two Types Of Preparation For Endocrowns:
1. A cervical margin in the form of a butt joint. It corresponds to a simple reduction of the occlusal height without peripheral preparation.
2. A peripheral preparation with a shoulder finish line.

In both cases, a preparation of the pulp chamber that does not extend into the root canals must be performed. Given the cervical discoloration, the peripheral preparation can give aesthetic results. However, the cervical third of the mandibular molar is not visible and does not cause an aesthetic problem. To keep as much dental tissue as possible, we chose the butt-joint margin.

For endocrowns, 90% of the failures were tooth fracture associated with displacement of restoration on the opposite side of the application of force.

Only 10% presented fracture of the tooth (in the apical third of the root portion) (6). Different materials like feldspathic, glass ceramic, hybrid composite resin and newest CAD/CAM (computer aided design / computer aided manufacturing) resin blocks can be used for fabrication of endocrowns (7-10). The endocrown, was first described using the CEREC system; however, other systems may be employed in this particular restoration. Recently, the VITA-PM9 system (Vident, Brea, CA, USA) has been commercialized. It consists of a pressed ceramic that uses a microparticulate coating.

The system employs thin feldspathic ceramic, which provides excellent resistance and polish (11-14).
In this case, the endocrown was made with lithium disilicate, which have esthetic result, provides excellent resistance and polish \(15,6\). However, according to some clinicians, pressable ceramic systems yield good functionality, retention, esthetics, and durability.

The essential advantage of this technique is the best fitting of the endocrown with the anatomy of the floor of the cavity and the option of using an articulator.\(17\)

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