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Minimally Invasive Restoration of Endodontically Treated Molars

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Abstract: *The restoration of the endodonticallytreatedtoothis awidelydebated topic in the literature and has been for manyyears. The criteriastudied are somany and the analyticalmethods are varied. Indeed, the "gold standard" is to choose the technique thatoffers the least invasive preparationwith maximum dental tissue preservation and improvedretention and resistance to fracture. The endocrownscouldbe an alternative torestoratea posterior endodonticallytreatedteeth. Therefore, the presentarticledescribes a case report of restoration of a non-vitallower molaran endocrown.*

Keyworlds: *endodonticallytreatedteeth, molars, endocrown, CAD/CAM technique*

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I. Introduction

Compared to vital teeth, fracture riskof endodonticallytreatedteethishigherbecause of loss of structural integrityassociatedwith dental caries, accesscavitypreparation, and root canal preparationratherthan changes in dentin**(1)**.With the development of adhesivesystems, the need for post-corerestorationsisreduced. Especially for restoration of excessivelydamaged endodontically treated molars, endocrowns have been used as an alternative to the conventional post-core and fixed partial dentures**(2)**.It consist ona total porcelain crown fixed to an endodonticallytreatedposteriortooth, whichisanchored to the internal portion of the pulpchamber and to the cavitymargins, thusobtainingmacromechanicalretention (provided by the pulpalwalls), and microretention (by usingadhesivecementation)**(3)**.In addittion, endocrown presents greater fracture strengththan conventional crowns**(4)**.

However, the success and longevity of the endocrownare directly related totooth 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 female patient was referred to our departmentfor restoring her firstleftmandibularmolar.Clinicalexaminationshoweda damaged molarwith a defectiveamalgam restoration (Figure1).Periapical radiographshowedanincomplete endodontic fittingof the apical third of the mesialrootdue tothe presence of a fractured file (Figure2).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 toothdidn't show any clinical symptomatology, endocrownrestorationwasrecommended.All the unsatisfactory restorative amalgam was removed from tooth #36. The canal entrances were sealed with conventional, chemically activated glass ionomer cement. The preparationconsisted of a cervical margin in the form of a butt joint and a central retentioncavityinto the entirepulpchamberconstructingboth the crown and the core as a single unit. The appropriatereduction of the buccal and lingual wallswasdone. Interocclusalspacewascarefullyevaluated and occlusal reductiondone to achieve a clearance of 2 mm (Figure 3).

A provisionalendocrownwasperformedusingpolymethacrylateand cemented with eugenol-free temporary cement (Figure 4). The impression was made with polyvinyl siloxane.The endocrownwas manufactured in the laboratory via indirect CAD/CAM technique. A lithium-disilicateblocks was chosen because of itssufficient fracture resistance value (Figure 5).

The patient returned for a try-in of the crown and to test theinternal and proximal adjustments,prosthetic retentionand 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. Next, silane was applicated and dried. After that, the tooth was isolated (Figure 6) and treated with 37% phosphoric acid for 30 seconds, then thoroughly rinsed and dried.

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.

Figure1: Severely damaged molarwithamalgam and provisional restoration.

Figure2: Initialradiograph:themesialrootisincompletelyfilled due to a fractured file

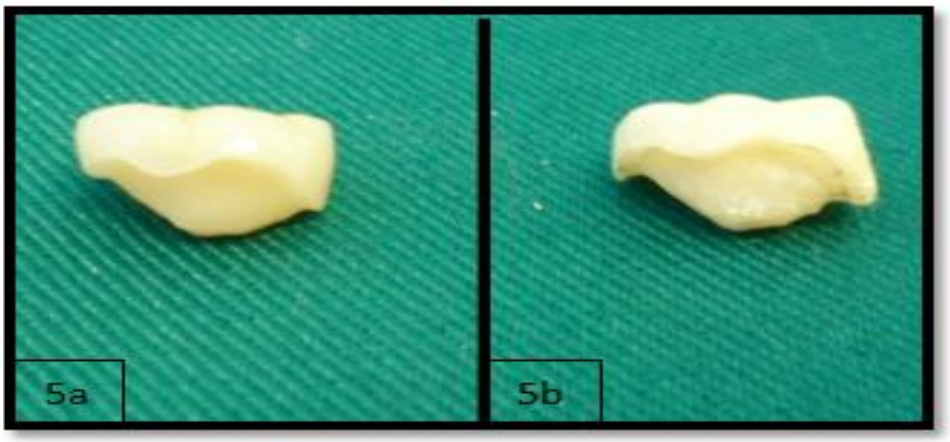

Figure 5a : Definitiveprosthesis

Figure3 : Molarpreparation

Figure 4 : Provisionalprosthesis

Figure 6 : Molar isolation beforeendocrownbonding

Figure 7: Clinical view after bonding theendocrown

II. Discussion

Endocrowndoesno needperipheraltoothpreparation; it's a good treatmentthatpreserves dental tissue. For preparation,the axial heightisreducedat least twomillimeters. 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 grooveon the buccalwallisdictated by the location of the amalgam and avoidsextra mutilationwith excessive occlusal reduction. The depth of the cameralchambershouldbe at least threemillimeters, witha divergence of the walls of eight to tendegrees.

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 heightwithout peripheral preparation.
2. A peripheral preparation with a shoulder finish line.

In both cases, apreparation of the pulpchamberthatdoes not extendinto the rootcanals.must be performed.

Given the cervical discoloration, the peripheral preparation can give esthetic results. However, the cervical third of the mandibular molar is not visible and does not cause an esthetic 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,wich have esthetic result, provides excellent resistance and polish(15,6).However, according to some cliniciens, pressable ceramic systems yield good functionality, retention, esthetics, and durability.

Theessential 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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