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Endocrown: A Way To Restore Badly Mutilated Endodontically Treated Molar

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Abstract

The restoration of a molar that has undergone endodontic treatment continues to be challenging. Following endodontic treatment, molars exhibited a loss of their mechanical properties. Clinicians must carefully examine the minimum invasive preparation of the tooth and the retention and durability of the restoration. As adhesive methods have advanced, the requirement for intraradicular anchorage and, consequently, the post-core system has significantly diminished. An endocrown is a restorative solution for a tooth that has undergone endodontic treatment with extensive damage to the crown. It is a viable alternative to the traditional methods of post-core restoration and full-coverage restoration. This case report describes successful management of endodontically treated molar with large coronal destruction by using an endocrown.

Keywords: NIL

Introduction

Endodontic therapy is a common procedure in dental practice [1]. Nevertheless, the loss of tooth structure can lead to a reduction in the tooth's mechanical properties and weaken it [1-3]. The decrease in structural integrity diminishes the tooth's ability to withstand fractures, hence affecting its long-term survival rate [2,4]. Possible causes of tooth structure loss includes caries, trauma, access cavities, and canal preparation [2,3,5]. Moreover, teeth that have had endodontic treatment experience reduced resistance to chewing pressures as a result of the impairment in the neurosensory feedback system following the removal of pulpal tissue [2,3]. This feedback system, when diminished, raises the pressure threshold in the periodontium, resulting in functional overload and reduced fracture resistance [5]. The success and long-term survival of teeth that had undergone endodontic therapy depend on the quality of the treatment and the appropriate restoration of the tooth's crown to preserve its function, shape, and appearance [5,6]. It is advisable to do the final tooth restoration after ensuring that the root canal treatment meets technical criteria and the tooth is free of symptoms [6]. The final restoration depends on the amount of remaining structure and the type of tooth, for example, whether it is anterior or posterior [6,7]. Post endodontic restoration varies from a direct restorative procedure (such as amalgam, glass-ionomer cement, and composite resins) to indirect procedures such as metal and ceramic inlays, onlays, and to post-retained full-coverage crowns [6]

Several limitations were noted in the post-retained restorations such as weakening of the tooth structure, root fractures, or in its application in narrow and calcified canals [8]. There has been a revolution in the way clinicians restore a tooth that had undergone endodontic treatment. Instead of using the traditional post and core method, we now opt for a less invasive

and more adhesive approach to restoration i.e an Endocrown [9]

The term "endocrown" was introduced by Bindl and Mörmann in 1999. However, its initial mention in the literature can be traced back to 1995 by Pssiss, who referred to it as the "ceramic monoblock technique." This technique is based on the concept of minimally invasive dentistry, utilising both macromechanical retention from the pulp chamber's floor and walls, as well as micromechanical retention from adhesive cementation.

This case report describes the successful management of endodontically treated molar with wide coronal destruction by using an endocrown.

Case Report

A 23yrs old male patient reported to the Dept. of Conservative Dentistry and Endodontics with the chief complaint of pain in lower left back region of jaw since 2 months. He gave history of root canal treatment with the same tooth 2 yrs back. Clinically large coronal destruction of crown was present restored with composite resin restoration. Tooth was mildly tender. Radiographic analysis showed underobturated mesial and distal canals. Re Root Canal Treatment followed by permanent restoration with an endocrown was advised to the patient.

Procedure

Patient consent was obtained. Rubber dam isolation was performed with 36. Access cavity was re-entered by removing previous composite resin restoration with round bur attached to high speed airotor handpiece. Gutta percha from both the canals was removed by using GP solvent and retreatment files (Figure – 3). Total four canals were noted. Patency is established with no.10k file (Figure – 4). The canals were cleaned and shaped thoroughly by using NiTi files till 25/4 % preparation each. In between irrigation was performed by using 17% liquid EDTA and 5.25% Sodium Hypochlorite. Intracanal medicament was given for 7 days and cavity was sealed temporarily.

After 7 days temporary restoration was removed and canals were irrigated with sodium hypochlorite and final rinse with saline was done to remove any remaining intracanal medicament. Obturation was performed with 25/4% GP points with all the canals. (Figure – 6) On completion of the endodontic therapy, an interocclusal clearance of 1.5 mm, a pulp

chamber depth of 4 mm, and a cervical margin of 2 mm were seen. (Figure – 7) Based on this amount of remaining tooth structure and thickness of the walls, a post endodontic restoration of lithium disilicate ceramic endocrown was decided.

Preparation of tooth for an Endocrown :

The undercuts in the access cavity were blocked using conventional composites resin cement. (Figure – 9) A cylindrical conical diamond bur kept parallel to the long access of the tooth without touching the pulp chamber to create smooth, tapered walls with a 7-degree occlusal taper, which creates a continuous chamber and access cavity.

The gutta-percha was removed up to a depth of 2 mm to obtain a saddle anatomy of the floor, which provides more stability and the orifices were sealed using resin-modified glass-ionomer cement. (Figure – 9) Appropriate reduction of the buccal and lingual walls were done to achieve an interocclusal clearance of 2 mm

An impression was made using polyvinyl siloxane impression using the putty technique, which was sent to the laboratory for the fabrication of prosthesis. (Figure – 10) On receiving the prosthesis, try-in was done where the marginal integrity was checked before cementation.

Preparation of an Endocrown for cementation:

The intaglio surface of the prosthesis was etched with 10% hydrofluoric acid for 30 s, rinsed with water, and dried with oil-free air syringe. Next, a coat of silane application was done for a minute. (Figure – 11)

Cementation of an Endocrown:

Isolation was performed with cotton rolls. Tooth surface was etched with 37% phosphoric acid for 20 s and rinsed with water and dried with cotton. (Figure – 12). Dual-cure resin luting cement was applied on the intaglio surface of the endocrown and was adhesively cemented onto the prepared tooth surface. Light curing was done for 3 s which facilitated any excess cement removal, followed by curing for 40 s on all the surfaces. No occlusal discrepancy was noted, (Figure – 13) and radiographic examination revealed proper marginal adaption. (Figure– 14).

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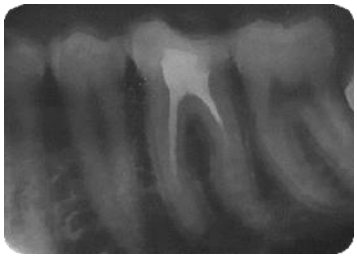
(Figure – 1)



(Figure – 2)

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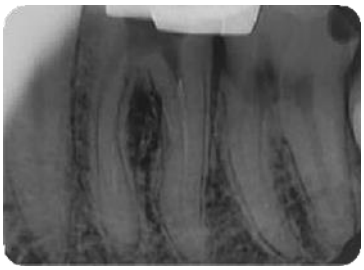

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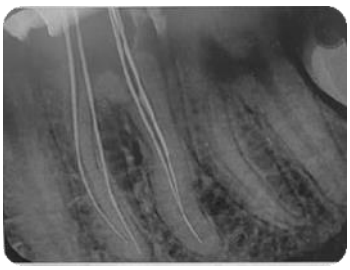

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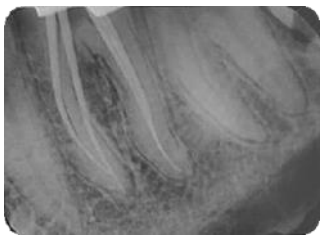

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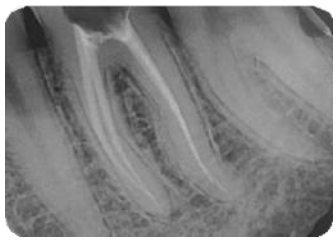

(Figure – 7)

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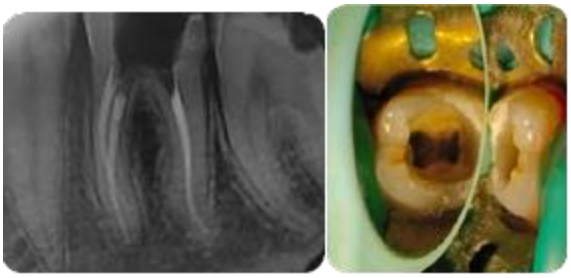
(Figure – 8)



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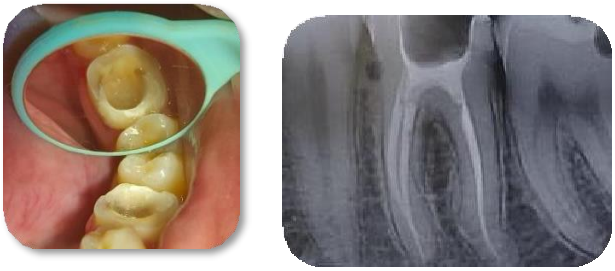

(Figure – 10)

(Figure – 11)

(Figure – 12)

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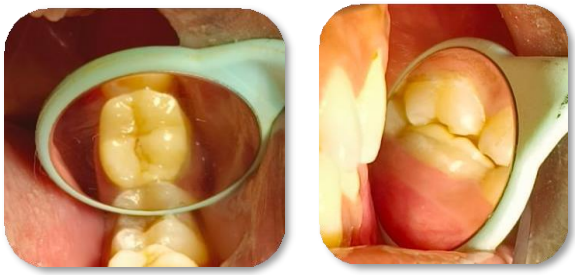
(Figure – 13)



(Figure – 14)

Preoperative radiograph

postoperative radiograph

Discussion

To achieve long-lasting clinical success when restoring teeth that had undergone endodontic treatment, it is essential to use minimally intrusive techniques and prioritise the preservation of dental tissues. Hybrid post/core/crown is often regarded as the preferred method for restoring ETT by many dentists. The Endocrown is a feasible alternative treatment method to the hybrid post/core/crown.

The endocrown approach utilizes the pulp chamber and the cavity margin with no root canal involvement. This results in less removal of tooth structure and achieving macro–micro mechanical retention from the pulp chamber walls and the adhesive cementation system[10]. This technique consists in combining the crown and core build-up in a single element or "monobloc"

The lifespan of any prosthesis relies on its ability to resist fractures, which is directly related to its occlusal thickness. with traditional restorations, the thickness typically ranges from 1.5 to 2 mm. However, with endocrowns, the thickness increases to 3-6 mm, which results in increased occlusal stress loading [11].

A post-retained manufactured prosthesis is created using materials with varying elastic moduli, such as glass- or metal-reinforced fibres for the post and ceramic/composite for the core. Consequently, there would be many contacts between dentin, luting cement, and the restorative material, resulting in a difference in stiffness. Endocrowns possess a monoblock structure, which allows them to withstand higher levels of stress [12,13]. An endocrown restoration is created using either a traditional heat-pressed method or a computer-aided design/computer-aided manufacture (CAD/CAM) system. Dental settings commonly employ CAD/CAM technology in the present era. It offers the benefit of delivering excellent restoration quality within a brief chair-side timeframe. Since the advent of CAD/CAM technology, numerous associated materials have been employed [10]. The most common materials used for endocrown are leucite reinforced, lithium disilicate reinforced ceramics, and monolithic zirconia ceramics. Lithium disilicate is one of the most used materials for endocrown. It has good aesthetic value and adequate mechanical strength [14,15]. Endocrowns are designed to preserve the biomechanical integrity of a weakened tooth structure for bonding. The placement of the cervical margin supragingivally serves to protect the surrounding gum tissue, aids in making accurate dental impressions, and helps maintain the integrity of the tooth structure.

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Forces are distributed over the cervical butt joint through compression and the axial walls through shear force,which helps to reduce the strain on the pulpal floor. Research has indicated that endocrowns exhibit a similar or even higher resistance to fractures compared to traditional crowns when utilised in molars, premolars, and even incisors [16].

Conclusion

Endocrown preparation is simple and can be accomplished efficiently. Root canals are not involved in the process, and the technique is less distressing than others. The endocrown is a promising treatment option for molars that have had endodontic treatment. It enables the preservation of tooth structure, aligns with the principles of minimally invasive dentistry, and is suitable for the concept of biointegration. This approach involves a conservative method for restoring nonvital posterior teeth, focusing on both mechanical and aesthetic aspects. This form of reconstruction, which remains infrequent, should be more generally recognised and implemented.

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