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Conservative management of extensively damaged posterior teeth: A case report on Endocrown

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Abstract

Rehabilitation of endodontically treated molar still remains a challenge. Molars lose their mechanical properties after endodontic treatment. In reality, they become fragile as a result of the pulp and surrounding dentin tissues being removed. Endocrown, a single partial restoration, could be an excellent option for restoring molars with substantial coronal damage and endodontic treatment challenges. The following case report details the endocrown-type restoration, fabricated from lithium disilicate ceramic (IPS e.Max CAD) in a mandibular first molar with extensive coronal destruction.

Keywords: Post endodontic restoration, Endocrown, Lithium disilicate ceramics

Introduction

Clinical success of an endodontically treated tooth is determined by post-endodontic restoration. Post-endodontic restoration will maintain and protect the existing tooth structure, while restoring esthetics, form, and function satisfactorily. The goal is to achieve minimally invasive preparation to restore endodontically treated tooth with optimum tissue preservation (1).

Depending on the extent of the coronal destruction of the tooth structure, 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, on lays, and to post-retained full-coverage crowns (2).

Recently, adhesive indirect partial coverage restorations have gained popularity over full-ceramic crowns. Conservative treatments such as overlays, and endocrowns minimize the amount of tooth structure removed while maximizing the remaining amount of intact tooth structure (3).

The first study published on endocrown restoration (or adhesive endodontic restoration) was conducted by Pissis in 1995 (4). In it, he described the ceramic monoblock technique for teeth with extensive loss of coronal structure. However, it was Bindl and Mörmann who named this restorative procedure "endocrown" in 1999 (5). The endocrown is a total porcelain crown fixed

to a depulped posterior tooth, which is anchored to the internal portion of the pulp chamber and to the cavity margins, thus obtaining macromechanical retention (provided by the pulpal walls), and microretention (by using adhesive cementation) (6). They are especially indicated in cases of molars with short, obliterated, dilacerated, or fragile roots and also used in situations of excessive loss of coronal dental tissue and limited interocclusal space, in which it is not possible to attain adequate thickness of the ceramic covering on the metal or ceramic substructures.

The objective of this clinical case report is to provide us an understanding of how to restore a posterior tooth with a conservative and aesthetic endocrown, while also highlighting its indications and applications.

Case report

A 28-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain in the upper right back tooth region. On clinical and radiographical examination, a deep class I carious lesion with diagnosis of symptomatic irreversible pulpitis was made and root canal therapy was initiated.

Various post-endodontic treatment options were considered. Since the tooth structure remaining was not sufficient to retain the core (fig 1), an extra retentive mechanism had to be taken from the pulp chamber. This condition is better satisfied with endocrown compared to onlay or overlay. Based on the patient's demands, a conservative post-endodontic management with a lithium disilicate endocrown (Emax) was suggested and planned.

Two millimeters of gutta-percha was removed from the canal orifices, and the orifices were sealed using resin-modified glass-ionomer cement. A minimal occlusal reduction of 1.5–2 mm with a central retention cavity of depth 4 mm inside the pulp chamber was prepared with slight divergent walls using #169L coarse diamond burs. Supragingival margin preparation with 90° shoulder finish lines (without bevels) were extended from gingival to the contact area with a WR-13 bur so as to achieve an interocclusal clearance of 2 mm (fig 2). The undercuts in the cavity were blocked using conventional resin composites. Impression was taken with putty and light-body polyvinyl siloxane material (3M ESPE) using a double-mix single-stage technique (fig 3) and sent to the laboratory. Self-cured resin temporary crown was cemented using a temporary cement without eugenol (Protemp 4 , 3M).

Adequate isolation was achieved using rubber dam, and after try-in of the endocrown, 5% hydrofluoric acid (Ivoclar Vivadent) was used to etch the inner surface of the endocrown for 20 seconds and then rinsed with water for 20 seconds. After air-drying, Monobond S (Ivoclar Vivadent) was applied on etched surface of ceramic in two coats. Meanwhile, the prepared tooth was etched with 37% phosphoric acid (Ivoclar Vivadent) for 15 seconds, rinsed, and dried, followed by the application of a dual-cure bonding agent (Tetric-N-Bond, Ivoclar Vivadent). A thin coat of a dual-polymerizing resin (ParaCore, Coltene) was applied to the treated surface of the endocrown, placed over the treated tooth, and tack-cured for 5 seconds to remove the excess cement, followed by final curing for 60 seconds on all surfaces. Finishing of the margin was done with finishing burs (yellow band Burs, Mani). The cemented endocrown is shown in occlusal view in figure 5, and the antagonist tooth is seen in occlusion with the endocrown in figure 6.

Discussion

Various improvements in adhesive techniques, composite resin materials, fiber posts, and indirect

ceramic materials have led to recent changes in the methods available for restoring endodontically treated tooth. Adhesive indirect partial coverage restoration maintains the biomechanical integrity of the compromised structure of nonvital posterior tooth.

Endocrowns assemble the intraradicular post, the core, and the crown in one component, thus representing monoblock (7). The indications of endocrown would include molars exhibiting large coronal destruction and having short, dilacerated, or fragile roots, whereas its contraindications would be patients exhibiting parafunctional habits, when the pulpal chamber depth is lesser than 3 mm, cervical margin is lesser than 2 mm and in cases where proper isolation and adhesion cannot be assured (6,8).

According to the literature, glass ceramics reinforced either with leucite or lithium disilicate have been the best option for the fabrication of endocrowns, since they exhibit higher flexural strength than feldspathic glass ceramics and resin composite and being able to withstand the occlusal forces during mastication(5,6,9). According to Taha et al., endocrowns with axial reduction and a shoulder finish line had higher mean fracture resistance values compared to endocrowns with butt margin designs (10). It has been also shown that butt joint designs provided a stable surface that resists the compressive stresses because it is prepared parallel to the occlusal plane. In comparison with endodontically treated teeth restored with crown and intracanal retainer, lithium disilicate endocrowns have exhibited stronger bonding to tooth structure and higher compressive strength as a result of less interfaces between the various restorative alternatives, according to a study conducted by Biacchi and Basting (6). The lithium disilicate ceramic used to make the restorations has high mechanical strength and provides restorations with an esthetic appearance very similar to that of tooth enamel. Thus, the success and longevity of endocrown depend on several factors like case selection, tooth preparation, selection of the most appropriate ceramic options, and the selection of bonding material.

Conclusion

Endocrowns have been a feasible alternative to traditional posts and cores. Better esthetics and mechanical efficiency, low cost, and short clinical time compared to conventional methods are the advantages of endocrowns, which can be used successfully for restorations of teeth with short clinical crowns. The endocrown fits perfectly with the principle of biointegration and can serve as the most conservative and esthetic alternative for the restoration of nonvital posterior tooth.

References

1. Trushkowsky R. Restoration of endodontically treated teeth: Criteria and technique considerations. Quintessence international (Berlin, Germany : 1985). 2014 Jul 1;45:557–67.
2. Mannocci F, Cowie J. Restoration of endodontically treated teeth. Br Dent J. 2014 Mar;216(6):341–6.
3. Mathew J, George L, Paul S, Joy A, Bejoy BM, Anitha S. “Conservative Bonded Restoration (An Alternative to Full Coverage Crown): A Case Report on Endocrown. Conservative Dentistry and Endodontic Journal. 2021 Mar 4;5(2):42–7.
4. Pissis P. Fabrication of a metal-free ceramic restoration utilizing the monobloc technique. Pract Periodontics Aesthet Dent. 1995 Jul;7(5):83–94.
5. Bindl A, Mörmann WH. Clinical evaluation of adhesively placed Cerec endo-crowns after 2 years--preliminary results. J Adhes Dent. 1999;1(3):255–65.

6. Biacchi GR, Basting RT. Comparison of fracture strength of endocrowns and glass fiber post-retained conventional crowns. Oper Dent. 2012 Apr;37(2):130–6.
7. Atash R, Arab M, Duterme H, Cetik S. Comparison of resistance to fracture between three types of permanent restorations subjected to shear force: An in vitro study. J Indian Prosthodont Soc. 2017 Sep;17(3):239–49.
8. Sevimli G, Cengiz S, Oruc MS. Endocrowns: review. J Istanb Univ Fac Dent. 2015;49(2):57–63.
9. Zhu J, Rong Q, Wang X, Gao X. Influence of remaining tooth structure and restorative material type on stress distribution in endodontically treated maxillary premolars: A finite element analysis. J Prosthet Dent. 2017 May;117(5):646–55.
10. Taha D, Spintzyk S, Schille C, Sabet A, Wahsh M, Salah T, et al. Fracture resistance and failure modes of polymer infiltrated ceramic endocrown restorations with variations in margin design and occlusal thickness. J Prosthodont Res. 2018 Jul;62(3):293–7.

Legend Figures

Figure 1: clinical condition of the tooth 16 after endodontic treatment

Figure 2: Tooth preparation with supragingival margins

Figure 3: Impression taken with polyvinyl siloxane material