Case Report

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Endocrown: An Alternative Approach for Restoring Endodontically Treated Molar : A Case Report

Abstract:
The endocrown is described as a monolithic (one-piece) ceramic bonded construction characterized by a supra-cervical butt joint, retaining maximum enamel to improve adhesion. It is milled using computer-aided techniques or by molding ceramic materials under pressure.

Key-words: Endocrown, Endodontically Treated Teeth, CAD/CAM, Post-endo Restoration.

Introduction:

Endocrowns were first developed by Pississ in 1995.[1] The restoration of endodontically treated teeth has been a challenge for many clinicians over the years. Endodontically treated teeth exhibit various physiological alterations in the dentin composition and microstructure which predispose the tooth to multiple risk factors, such as, reduced retention/stability, increased tooth fragility, compromised substrate adhesion and eventually leading to failure of the prosthesis.[2]

Indications:

The endocrown is suitable for all molars, particularly those with clinically low crowns, calcified root canals or very slender roots.

Contraindication :

- If adhesion cannot be assured,
- If the pulpal chamber is less than 3 mm deep
- If the cervical margin is less than 2 mm wide for most of its periphery.[3]

This ceramic crown restoration was proposed in 1999 by Bindl and Mörmann as an alternative to the full post-and-core-supported crown; "endocrown" would be cemented to the internal walls of the pulp chamber and on the cavity margins for bettermacromechanical retention and the use of adhesive cementation would also improve adhesion.[4]

Purpose of this case report is to present a clinical case, in which an esthetic and conservative posterior endocrown was fabricated to restore a mandibular molar that was treated endodontically.

Case Report:

A 19 years old male patient visit to the Department of Conservative dentistry and Endodontics with the chief complaint of food lodgment in lower left back tooth region since 1 month. The medical history was not significant. Clinical and radiographic examinations were performed initially, carious tooth was identified irt 36 and tooth was tender on percussion.

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On radiographic examination, radiolucency was seen irt 36 approaching to the pulp and widening of lamina dura around the root. (Figures 1 and 2). The final diagnosis was made Irreversible pulpitis with apical periodontitis irt 36.

Fig.1 PRE-OPERATIVE PICTURE

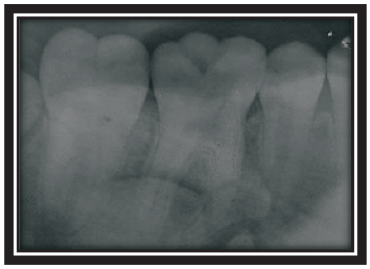

Fig.2 PRE-OPERATIVE RADIOGRAPH

The final Treatment plan non-surgical root canal treatment irt 36 followed by endocrown was made.

In the first appointment, rubber dam isolation was achieved after administration of Local anaesthesia. Working length was determined by #10 k file. (Figure 3) After that Root canal preparation and irrigation was done using 2.5% sodium hypochlorite and saline, calcium hydroxide was used as an intracanal medicament and cavit was placed to seal the cavity.

In the second appointment, canals were cleaned chemo-mechanically, master cone was taken followed by the obturation. (Figures 4 and 5).

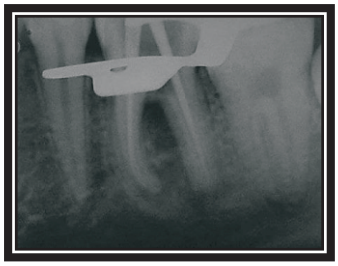

Fig.3 WORKING LENGTH

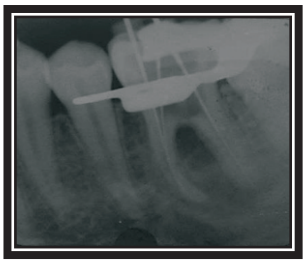

Fig. 4 MASTER CONE

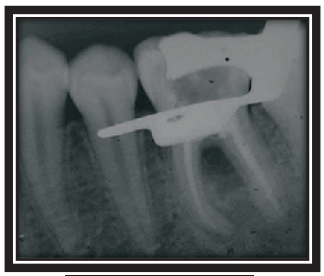

Fig. 5 OBTURATION

Steps in Occlusal preparation:

The first step is to achieve an overall reduction in the height of the occlusal surface of atleast 2 mm in the axial direction. Orientation of the bur along the major axis of the tooth and held parallel to the occlusal plane this allows a flat surface, which determines the position of the cervical margin or "cervical sidewalk. "The cervical margin should be supragingival, follow the gingival margin.

Steps in Axial Preparation:

In this step undercuts are eliminated in the access cavity. A total occlusal convergence of 7° is used to create continuity between coronal pulp chamber and endodontic access cavity with help of a cylindrical-conical green diamond bur. The Bur is oriented along the long axis of the tooth, the preparation is carried out without excessive pressure and without touching the pulpal floor. Removing too much tissue from the pulp chamber walls will reduce their thickness and the width of enamel. The depth of the cavity should be at least 3 mm. Thereafter, lining the root canal entrances with flowable composite to protect the orifice of the canal. (Figure 6)

Fig. 7Putty Impression

Fig. 6 Tooth preparation irt 36

After evaluating cavity preparation and the interocclusal space, the impression of the tooth was taken by dual impression technique using additional silicone material. After evaluating the impression, selectthe ceramic shade and sent the impression to the laboratory.Theendocrown restoration was fabricated in the laboratory byusing CAD-CAM technology. Then try-in of the endocrownrestoration was done,and checked for its occlusion, internal, and proximal surfaces. In the following session for cementation of endocrown, pretreatment of restoration was done by acid etchingwith hydrofluoric acid, rinsed with water, and air dried. Next, a coat of a silane coupling agent was applied for 1 minute and air dried.

Rubber dam was used to achieve proper isolation, the treatment to tooth surface allows with etchant 37% phosphoric acid for 15 second and then abundantly washed and air dried, after that bonding agent was applied to tooth and polymerized for 20 sec with curing light.

Thin layer of dual-cure resin (Sirona, Dentsply) , was applied to the inner surface of prosthetic endocrown and then was placedonto the prepared tooth and polymerized at intervals of 5 seconds and remove the excess cement. After that, it was polymerized for 60 seconds on each surface**.** The restoration was examined for any occlusal interference and the final restoration is shown in (Figure 8).

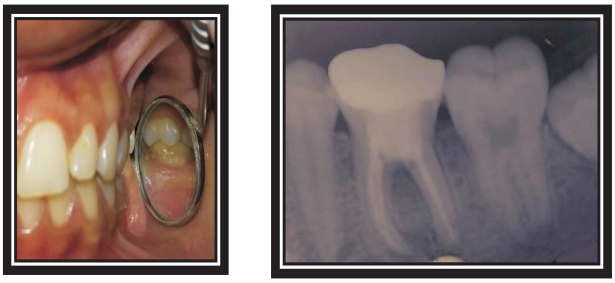

Fig. 8 Post operative picture & radiograph after cementation

Discussion:

The endocrownrestoration is appropriate for all molars, especially for those with clinically low crowns, calcified root canals, or narrow canals. But it is not recommended if adhesion cannot be assured, if the pulpal chamber is less than 3 mm deep, or if the cervical margin is less than 2 mm wide for most of its circumference.[3]

These restorations have macromechanical retention by being anchored to the internal portion of the pulp chamber and to the cavity margins and microretention by adhesive cementation.[5]

According to Bernhartet al. [6]They concluded that endocrowns "represent a very promising treatment alternative for endodontically treated molars." In 2012, Biacchi and Basting [7] compared the fracture strength of 2 types of full ceramic crowns: indirect conventional crowns retained by glass fibre posts and endocrowns and they concluded that endocrowns were more resistant to compressive forces than conventional crowns.

In 2018, Dartora et al. have evaluated the biomechanical property of endodontically treated teeth restored using different extensions of endocrowns inside the pulp chamber; it has concluded that the greater extension of endocrowns provided better mechanical performance. A 5 mm extension presented lower intensity and a better stress distribution pattern than a 1 mm extension which presented a low fracture resistance and a high possibility of rotating the piece when it is in function. [8,9]

According to Belleflamme et al., even in the presence of extensive coronal tissue loss or occlusal risk factors, such as bruxism or unfavorable occlusal relationships, endocrowns could be a reliable approach to restore severely damaged molars and premolars.[10]

This has been shown to be an advantageous technique as the procedure is easy; it facilitates the steps of impression taking and protects the periodontium. [11,12] Also, the use of ceramic has the advantages of biocompatibility and biomimicry and its wear coefficient is close to that of the natural tooth. Furthermore, the single interface of a 1-piece restoration makes cohesion look better. [13,14]

Conclusion:

The preparation for endocrowns is rational and simple and can be performed quickly. Root canals are not involved in the process, and the procedure is less traumatic than alternatives.

The endocrown represents a very hopeful treatment alternative for endodontically treated molars, it allows maintaining of tooth structure, it is compatible with goal minimally invasive dentistry, and it is adequate for the concept of biointegration.

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