Endocrowns: A Comprehensive Review

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Abstract

Endocrown are indicated after every endodontic treated tooth. For good stabilization of endocrown prevention of healthy tooth structure was essential for tooth stabilization and adhesion of tooth. Due to biomechanical preparation the chances of failure of crowns in case of endodontic treated teeth than vital teeth. In recent years there are various advancements in endodontic materials like new adhesive systems which reduces the need of post-core restoration in the tooth. In excessively damaged teeth, endocrowns are used as an alternative method of partial denture and post-core. The advantages of endocrowns are aesthetical good, increase mechanical performances, and cost-effective. This article provides areview of endocrown used for endodontically treated teeth in the clinical practice.

Keywords: *Crowns; Post; Root Canal Treatment.*

Introduction

During the endodontic treatment, the complete removal caries by air rotor in first sitting is needed to further decay of tooth.[1,2] In this process of removal of caries leads to a considerable amount of enamel and dentine was lost during the initial access cavity preparation.[3] This process leads to insufficient tooth structure to support the filling material. The one most common complication in these type cases is the increasing chance of crown or root fracture due to chewing forces.[4] The type of dental filling material used for restoration depends on the position of the tooth anterior or posterior because in posterior teeth there are heavier forces seen as compare to anterior tooth and amount of tooth structure left after root canal therapy.[5]

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To treat these type cases there is clinical protocol were suggested like in anterior teeth with small access cavity which can resort by simple composite material and there is no need of placement of crown.[6] In posterior tooth after endodontic therapy need coverage of cuspal area because of its help to bear mechanical forces.[7] In case of less amount of healthy tooth structure left behind need a post and core procedure before crown placement.[8] In case where post and corenot indicated use of extra retentive features are usedas pins and castable posts give extra retention to the filling and crown. Post can be two types of prefabricated metal post or one-piece custom made post and core.[9-11]

Most of the studies showed that post preparation leads to loss of radicular structure to place post might weaken the root which leads to fracture of the tooth.[12] One most important complication of post was retreatment of endodontic treated tooth. Adhesives play an important role in the restoration of endodontic treated teeth.[13] In the year 1995 Pissis present a new technique with combined porcelain to metal crown in a single unit and the technique called monobloc which replaces the previous tradition technique metal post.[14] Based on the concept of Pissis, the Endocrown technique was introduced by Bindel et al. in the year 1999.

In various studies, the results show that endocrowns

in molar are high success rate and higher fracture resistance as compared to posts.[15-19] Endocrowns are easier to prepare and apply and require lesser clinical time and visits. Endocrowns have superb esthetic properties, and in cases of adhesive restorations decrease the penetration of microorganisms in apical and coronal part to improve the clinical success of endodontic treatment. Endocrowns are a greater advantage as compare to post because posts are not indicated in short and narrow canals.[20]

Changes Occuring in Endodontically Treated Teeth: The factors associated with endodontic treated teeth are more prone to fracture resistance due to loss of tooth structure due to caries, trauma and cavity preparation. Appropriate selection of restorative materials is important for the longevity of endodontic treatment.[21] The integrity of the left tooth structure would be preserved for a solid base required for restoration and increase the strength of endodontic teeth.[22] The strength depends on hard tissue and the anatomic form of the tooth is the principle of biomechanical tooth preparation. Studies showed that there was no influence of variation in tissue on tooth biomechanical behavior.[23] Minimal access cavity preparation helps in the decrease the chances of fracture resistances.[24] The other important factor for decrease durability was the loss of marginal ridge in tooth. Another important study done by Gohring et al[25] showed that loss of dentine during the endodontic access cavity and root canal preparation after biomechanical preparation increases the brittleness of tooth. Guzy and Nicholls[26] observed that in the study decrease in the durability and strength by 5%, 20%, and 63% due to access cavity preparation, restorative procedure, and occlusal cavity preparation on Tooth cusp.

Restoration of Endodontically Treated: The remaining tooth structure left after caries removal and completion of endodontic treatment tell the suitable dental filling material, choice of material was controversial it was choice of treating dentist which material he placed according to his choice no special guidelines are given by American Association of endodontics. Function requirements are one of the important factors for deciding the choice of material for treatment planning.[27]

Risks and shortcomings in conventional post and core:[28-30]

- Perforations during the post and core procedure leads to further endo-perio lesion and sometimes leads to fracture of root.
- In prefabricated post made up of glass fiber reinforced posts (GFRP) in the root canal some time not bond to radicular dentine and in long loss crown due to heavy masticatory forces.
- The limitation of amalgam core build-up material was if there was less tooth structure additional pins were placed which further decrease the strength of the tooth. It was not indicated in the esthetic area because after 5-7 years it gives discoloration in the gingival margin.
- Glass ionomer cement lack of adequate strength.
- Composites material has good strength and has the ability to binds with the surrounding tooth structure and the disadvantage of composites is polymerization shrinkage leads microleakage which causes further plaque and calculus formation and these leads to treatment failure.

Preparation Technique for Endocrowns[31-35]

Occlusal Preparation:

- Overall reduction of 2mm in the axial direction
- Diamond wheel bur was used for the occlusal surface
- Bur used parallel to occlusal plane
- Cervical margin should be supragingival, in area estherics require subgingival margin angle below 60°
- 2mm thick enamel walls will be removed

Axial Preparation:

- The first step after occlusal reduction was removing all the undercuts in prepared access cavity.
- The convergences angle was 7°for both access cavity and coronal pulpal area.
- The depth of cavity between 3mm to 5mm.
- Avoidance excessive removal of coronal dentine which leads to endocrowns in future.

Polishing the Cervical Band:

- In this step, we remove all the irregularities from the tooth surface
- Large diameter fine particle bur was used for polishing

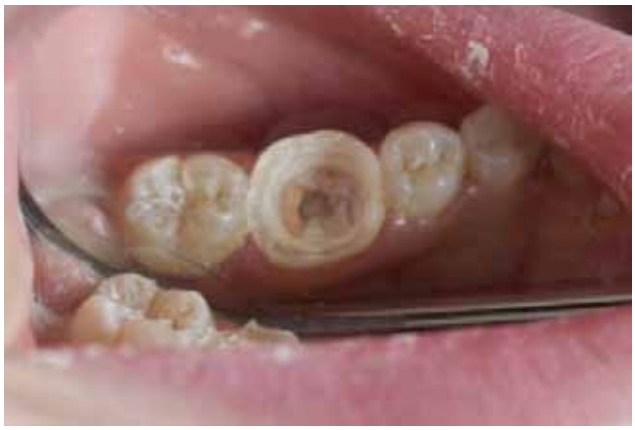

Figure 1. Removal of irregularities from the tooth surface

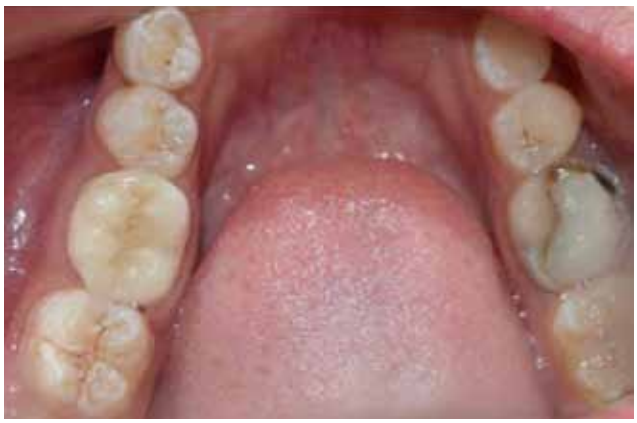

Figure 2. Polishing

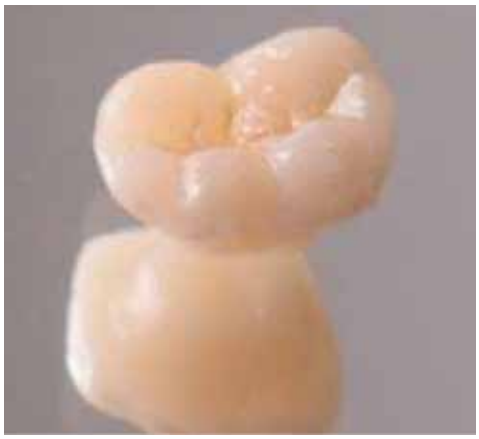

Figure 3. Bondning

Bonding

- Adhesives such as self-adhesive and composites such as are used for bonding the endocrown to the prepared tooth.

Impression technique/Manufacturing: As compare to conventional rubber bass impression digital impression are more helpful to these types of case because it takes accurate record of prepared preparation of crown and it's to send the scan for CAD/CAM crown preparation. These digital impressions tell us if there any undercut present in the cutting to its easy to correct the preparation and make it less time consuming and no need for a diagnostic wax-up trial.

Indications of Endocrowns:

- Successfully treated endodontic treated tooth.
- In case less interproximal space and occlusal hight.
- In case were post and core not possible
- In the case of calcified, curved canals.

Contraindications of Endocrowns:

- In case of parafunctional habits
- In case of were proper isolation is not possible due to excessive saliva
- Cervical margin less than 2mm and depth less than 3mm.

Advantages of Endocrowns:

- Less complex to perform and easier to perform in patients
- Allow less reduction of radicular dentine so the strength of the tooth was not hampered
- Allow retreatment of a root canal if indeed in future
- Less chair side time and cost to the patient

Disadvantages of Endocrowns:

- Risk of debonding of crown and root fracture

Conclusion

An endodontically treated tooth in those cases where post and core was not indicated in these types of case endocrown. Endocrowns preserve the tooth structure and has several mechanical and aesthetic advantages. It's indicated in posterior teeth and showed better performance in molars than premolars.

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Ethical Issues: Approved

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