



International Journal of Multidisciplinary Research and Growth Evaluation.

Conservative treatment modality for restoration of Endodontically treated teeth with Endocrown: A case report

Dr. Krishna Prasada L^{1*}, Dr. Priyanka Yadav²

¹ Head of Department, Department of Conservative Dentistry and Endodontics, KVG Dental College and Hospital, SULLIA, Dakshina Kannada, Karnataka, India

² Student, Department of Conservative dentistry and endodontics KVG Dental College and hospital, SULLIA, Dakshina Kannada, Karnataka, India

* Corresponding Author: **Dr. Krishna Prasada L**

Article Info

ISSN (online): 2582-7138

Volume: 03

Issue: 02

March-April 2022

Received: 03-02-2022;

Accepted: 04-05-2022

Page No: 274-276

Abstract

Coronal rehabilitation of severely damaged endodontically treated teeth (ETT) is the most challenging task as there is high risk of failure than vital teeth. Advances in adhesive dentistry have made great contributions to cosmetic & restorative dentistry over the past few decades. The endocrown is indicated for the restoration of severely damaged molars, which requires specific restoration techniques to satisfy criteria that are primarily biomechanical in nature. In this paper, restorations of severely damaged molar teeth were done by endocrown which represent a conservative and esthetic restorative alternative to full coverage crown. This endocrowns can be acid etched, that have aggregate strength and esthetics, that bond to remaining tooth structure. New generation of ceramics & adhesives may lead to view of this endocrown as an alternative to conventional crown root anchored restoration.

Keywords: Endocrown, coronal rehabilitation, molars, monoblock, crown & post free adhesive restoration

Introduction

In reconstructive dentistry, rehabilitation of severely damaged endodontically treated teeth (ETT) is one of the most difficult task [1]. Restoration of ETT with extensive coronal loss has followed a strict protocol, with the fabrication of total crowns supported on post-cores. The purpose of a post-core restoration is to stabilize the remaining coronal tooth structure & to replace missing coronal tissue [2]. But many author disagree with the use of posts due to various risk associated with it such as root perforation, root weakness and failure of teeth restored with posts.³ But now a days, with the advancement in technology in the field of adhesive dentistry, restoration of endodontically treated teeth can be done with onlays and overlays, by using the pulp chamber as a retentive resource which had made possible due to acid etchable ceramics such as leucite and lithium disilicate based ceramics, dental adhesive & resin cements. By using such resources, endocrown is a conservative treatment modality for restoration of endodontically treated teeth in which pulp chamber is used as a retentive resource [2, 4].

In 1995, Pissis was one who first described restoration of teeth with extensive loss of coronal structure with ceramic monoblock technique [5]. But the terminology “Endocrown” was coined given by Bindl and Mormann in 1999 [4]. The endocrown is a total porcelain crown which is luted to a depulpated posterior tooth. In this endocrown, macromechanical retention is achieved by internal portion of pulp chamber & to the cavity margin and microretention is obtain by adhesive cementation technique [2, 6]. In this case report, Endocrown treatment modality which is used to restore badly destructed endodontically treated tooth (ETT) which is fabricated from lithium disilicate ceramic. In this paper, Endocrown has been discussed as a conservative and alternative treatment modality to post & core. The “Endocrown” provides good esthetic, better mechanical performance, can be performed with less cost & less clinical time.

Case Report

A 22 year old male reported to the department for restoration of mandibular right first molar with a crown. There was extensive destruction of coronal structure & it had adequate interocclusal space. The periapical radiograph revealed radiolucent area seen in enamel and dentin and extending into pulp, also widening of periodontal ligament space was seen in relation to 46. Radiolucency was seen wrt mesial root of 46.

The gingival tissue was healthy. Root canal therapy followed by Endocrown was decided as treatment option for restoration of this tooth as only half of the residual tooth structure was remaining. The entire procedure was explained to patient and written consent was taken from patient. Access opening was done under rubber dam isolation. Patency was obtained with #10 K-file. Chemo-mechanical preparation was done under copious irrigation with saline, EDTA and sodium hypochlorite. Master cone fit was checked and obturation was done, followed by application of sealing the pulp chamber with glass ionomer cement. Diamond wheel bur was used to reduce occlusal surface at least 2mm in the axial direction by orienting the bur along the major axis of tooth & held parallel to occlusal surface. This ensured a flat surface and it determines the position of cervical margin. Cervical margin was kept supragingival. Axial preparation included removal of undercuts in the access cavity which was carried by conical diamond bur. The bur was oriented along the long axis of tooth & total occlusal convergence of 7° was

used to make coronal pulp chamber & access cavity continuous. The depth of the access cavity should be kept, at least 3mm. Care should be taken not to remove too much tissue from the pulp chamber. Cervical band was polished with polishing bur which was kept around the entire surface of cervical band to produce flat & polished surface. The finished line appeared as a regular line with a sharp edge. Next pulp canal was opened and gutta-percha was removed up to 2mm so as to take the advantage of the saddle like anatomy of the cavity floor. To maintain the integrity of canal entrance this procedure was done with a nonabrasive instrument, drilling of dentin should be avoided. Pulp chamber and pulpal floor was thoroughly cleaned. Gingival retraction cord 00 (Ultrapak, Ultradent) was applied and impression was made with Polyvinylsiloxane silicone (Aquasil LV, Dentsply DeTrey, Germany) of light and heavy consistency using a putty wash technique.

Laboratory Procedure

The endocrown was fabricated from lithium disilicate-based ceramic (IPS E.Maxpress, IvoclarVivadent) by injecting the melted ceramic pellet into a lining mold which was fired in a furnace at 8500 c. Endocrown was fitted on the crown and occlusal adjustments were done with finishing burs. Self-adhesives composite such as Multilink (Ivoclar, Schaan, Liechtenstein) was used for bonding the endocrown to the prepared tooth.



Fig 1 (A): Initial aspect of the right mandibular first molar **(B):** Radiographic aspect of right mandibular first molar; **(C, D):** access opening (MB, MM, ML, DB, DL)

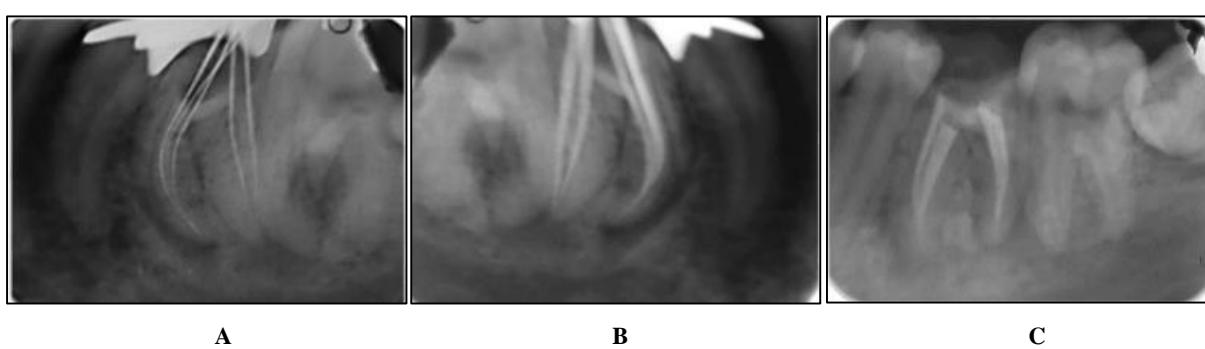


Fig 2 (A): Working length radiograph (MESIAL ANGULATION); **(B):** Master cone radiograph **(C):** Obturation radiograph

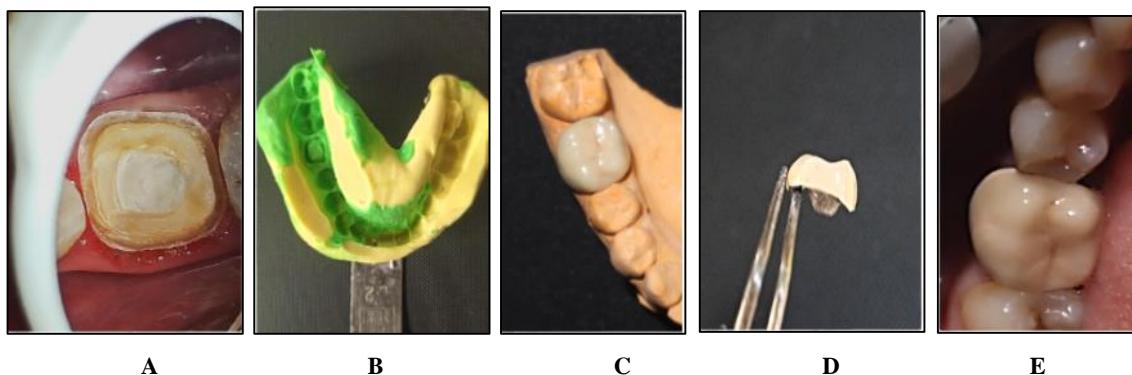


Fig 3 (A): Tooth preparation for endocrown; **(B):** Impression made with polyvinyl siloxane material; **(C, D):** Fabrication of endocrown; **(E):** Occlusal view following final cementation.

Discussion

In literature, there has always been a controversy regarding ideal treatment for restoration of ETT teeth. For long term success, there is need to conserve the remaining healthy dental tissues, which provide anchorage to tooth-restoration complex. In today's adhesive dentistry era, endocrown can be considered as a conservative and feasible alternative to conventional post & core crown. In cases of molars with obliterated, short, dilacerated or fragile roots endocrowns are specially indicated. They may be done when there is excessive loss of tooth structure and limited interocclusal space in which case it is not possible to have sufficient thickness of ceramic covering on the metal substructures.² But if depth of pulp chamber is less than 3mm or cervical margin is less than 2 mm wide and if adhesion cannot assured, in such cases endocrowns are contraindicated^[7]. 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 Endocrown. In this case, lithium disilicate, reinforced Glass ceramic (IPS eMax Ivoclar vivadent) is used which provides adequate mechanical strength and esthetics. Biacchi and Basting in 2012 compared the compression forces of traditional crown with fibre post and endocrown and found more favorable results with endocrown^[8]. Several in vitro studies have proven the validity of bonded endocrown with conventional crowns. Endocrowns are relatively new, easy and quick to perform. It has several advantages like less number of interfaces in the restorative system. Preparation design is conservative and biologic width is minimal. The differences in the modulus of elasticity between the harder ceramic and dentin, there is risks of debonding and root fracture in endocrown. Hence, case selection is very important and critical for long term success^[9]. The success and longevity of Endocrown depend on many factors like case selection, correct preparation, the selection of most suitable ceramic options, and the choice of bonding material. The endocrown fits perfectly with the concept of bio integration and can serve as a most conservative and esthetic option for restoration of non-vital posterior tooth.

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