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Bilateral lesion centered access cavity preparation in mandibular first premolars: A case report

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Abstract

Lesion-centered access cavity preparation has gained attention due to the conservative and reliable approach to the main canal with preservation of tooth structure and aesthetics. Traditional access cavity preparation in tooth with cervical caries causes increased loss of tooth structure. In this case report, a cervical approach of access cavity preparation and root canal therapy was attempted by excavation of the cervical caries on right and left mandibular first premolar. A 38-year-old patient was referred with the chief complaint of pain in the left and right lower back tooth region for past 1 week. Based on the clinical and radiographic findings, a diagnosis of irreversible pulpitis was established. Minimally invasive access cavity preparation was completed through the Bucco-cervical surfaces, canals were located using DG-16 probe, straight line access was established, cleaning and shaping was carried out using flexible heat-treated rotary files and obturated. The cervical access cavity was restored with composite resin to re-establish aesthetics and function. Treatment was completed with reduced iatrogenic damage to tooth structure with conservation of occlusal surfaces and a follow-up was done after 1 year to evaluate the prognosis.

Keywords: Lesion Centered access, conservative access cavity, cervical caries, minimally invasive approach

Introduction

Endodontic therapy comprises three important steps which include- access cavity preparation, cleaning and shaping, disinfection and three-dimensional obturation of the root canal system. However, access cavity preparation is known to be one of the most challenging as it determines the outcome of the endodontically treated tooth^[1]. Traditional Endodontic Access Cavity (TEC) leads to weakening of tooth structure. Hence, Clark and Khademi modified the endodontic access cavity designs to reduce the loss of excessive tooth structure, and this was termed as the Conservative Endodontic access Cavity (CEC)^[2].

Various access cavity preparation methods have been reported to improve fracture resistance and reduce the need for dependency on complex and expensive post endodontic restorations^[3]. In our report a lesion centered approach to access cavity was attempted. The prime objective of this access cavity designs is strategic dentin preservation.

Case report

A 38-year-old male patient reported to the department of Conservative dentistry and Endodontics, Sri Venkateswara Dental College, Ariyur, Puducherry, with the chief complaint of dull spontaneous pain in the left and right lower back tooth region for past 1 week. Intraoral examination revealed cervical caries of the right and left mandibular first premolar (FDI- 34 & 44). Tooth was tender to percussion and there was absence of sinus tract or extra-oral swelling. Radiographic examination of 34 and 44 showed radiolucency in the cervical region suggesting pulpal involvement with widening of periodontal ligament which was confirmed with a pulp sensibility test which gave a delayed response. Based on clinical and radiographic evidence, a diagnosis of irreversible pulpitis was established. [Fig 1(a and b)] Root canal treatment was planned for both the teeth with an interval of 4-5 days.

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Fig 1: Pre-operative clinical images showing cervical caries in 34 (a) and 44 (b)

Coronal Access

Tooth was isolated using a cotton rolls and evacuators due to the presence of cervical caries. Access cavity preparation was made exactly through the Bucco-cervical carious lesion and the access to pulp chamber was gained from the cervical surface to roof of the pulp chamber by orienting the bur perpendicular to the long axis of the tooth in oval shape occluso-cervically with a small round bur (Mani Inc. bur size no #2). Orifices were conformed using a DG-16 probe the access to the pulp chamber was gained. De-roofing above the canal orifices was done using safe ended diamond bur (Mani Inc.). [Fig 2]



Fig 2: Lesion- Centered approach of access cavity preparation [a] 34 and b) 44]

Shaping and Cleaning

A pre-curved, K-file size #10 (Dentsply/ Maillefer) using a watch-winding motion until it reaches the root apex for establishing patency. Pulpal tissue was extirpation using a #15 stainless file. After which, the working lengths of the root canals were determined with size 15 stainless steel hand file and an electronic apex locator (Root ZxII, J. Morita and Co, USA) [Fig 3]. After establishing glide path, ProTaper gold rotary system (Dentsply Maillefer, Ballaigues, Switzerland) was used in a crown-down technique for cleaning and shaping the canal. Final irrigant i.e 17% EDTA was activated prior to obturation using Endo activator sonic activation.



Fig 3: Establishing patency and working length determination: [a] Clinical and b) Radiographic image]

Obturation

The canals were then dried using paper points (Dia Dent). A gutta-percha point of F2 6% taper of length 19.5 mm was placed and master cone radiograph was taken [Fig 4].



Fig 4: #F2 6% Gutta-percha inserted through bucco-cervical opening for verifying master cone. [a] Clinical image and b) Radiographic image]



Fig 5: Obturated canals of 34 and 44 with gutta-percha sheared at orifice [a] 34 and b) 44].

Post-Endodontic Management

The cervical access cavity was restored with fibre reinforced composite resin (EverXposterior, GC India) for dentin replacement followed by universal nanohybrid composite resin (Filtec Z 250 XT, 3M ESPE, India) to re-establish aesthetics and function. A radiograph was taken to visualize adequate packing of the restorative material [Fig 6].

Treatment was completed with reduced iatrogenic damage to tooth structure with conservation of occlusal surfaces.

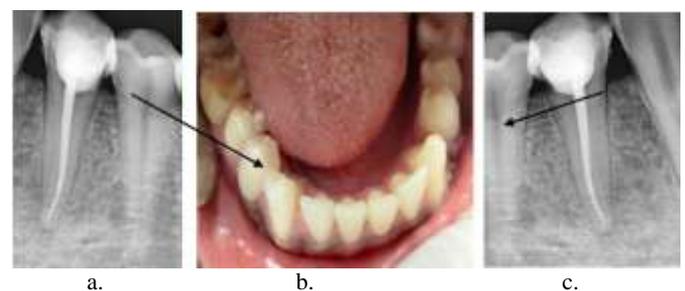


Fig 6: Post-operative clinical and radiographic images showing composite core buildup of Root canal treated teeth and occlusal view showing intact occlusal surface [a] 34, b) Occlusal view and c) 44]

A follow -up was done after 4 months to evaluate the prognosis which revealed that patient was asymptomatic with no tenderness or pain and showed no clinical damage in the cervical restorations and intact occlusal surfaces [Fig 7].



Fig 7: Follow-up clinical image showing intact tooth structure in occlusal view.

Discussion

Successful root canal treatment mainly depends on complete shaping, cleaning and disinfection of root canals and filling it biologically compatible materials [4].

Several conservative access cavity designs such as conservative endodontic access, ultraconservative “ninja” access, and orifice-directed “truss” access have been attempted and studied but no specific definitions exist for each of these designs at this time and the purpose of all these designs for was the conservation of remaining tooth structure [5]. However, a major drawback of these designs was the chances of improper pulp tissue removal and missed canals due to less accessibility [6].

Almeida in 1994 attempted Lesion Centered access cavity design cervical window preparation. According to this study, this type of design would be useful in teeth with obstructed orifice, calcified chamber, and presence of crown where traditional access cavity would be difficult to attempt. The results of the study showed that restoration of the cervical lesion and endodontic access with resin composite increased the fracture resistance to be nearly equivalent to that of an intact tooth [7]. Bassir *et al.* studied the relationship between the amount of tooth structure lost and restorative technique and concluded that the remaining tooth structure was directly proportional to the fracture resistance of endodontically treated premolars [8].

A study conducted by Mookhtiar *et al.* showed that minimal invasive approach in access opening avoids the need for conventionally placed crowns [9]. As tooth structure loss increased, so did the percentage of unfavourable fractures. The results of the present study confirmed that the remaining tooth structure is an integral part of tooth strength and is an important factor in determining the fracture resistance of tooth [10]. Hence, in this case report the need for tooth reduction in two teeth for the placement of crown has been avoided thereby preserving maximum teeth structure. Thus, clinical experience and proper radiographic assessment is necessary while planning a lesion centered access.

Conclusion

Lesion centered access has gained interest due to the conservation of coronal tooth structure and preservation of the healthy tooth structure with the minimally invasive approach. Especially in a tooth with cervical caries, the key importance of lesion centered approach would be the conservation of masticatory surface which would aid in maintaining the patient’s existing occlusion. Thus, the minimal invasive approach in access opening avoids the need for conventional crown placement.

Conflict of Interest: None

Acknowledgements: None

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