

Modified Tunnel Preparation for Ultra-Conservative Posterior Composite Restoration: A Case Report

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ABSTRACT

Background: Modern dentistry has given the concept of minimally invasive dentistry which has offered a more conservative approach for restoration of carious teeth. The marginal ridge of posterior teeth represents a strategic structure for maintaining the residual tooth strength. A minimally invasive approach should be considered to retain this structure through alternative access pathways. Several techniques have been suggested for the treatment of proximal carious lesions, but their results have been less than ideal. The aim of this article is to present an ultra-conservative treatment modality of an interproximal carious lesion by composite resin restoration, without the loss of marginal ridge thereby, preserving the strength of the tooth.

Keywords: Minimally Invasive Dentistry, Proximal carious lesion, Composite resin.

INTRODUCTION

G.V.Black's approach to treat interproximal carious lesions by the removal of infected dentin and extension to the areas that were presumed to be caries free, so as to ensure for the better retention of the restorative materials.¹ But the biggest disadvantage of G.V.Black's Class-II cavity preparation is the loss of interproximal marginal ridge of the tooth. Loss of interproximal marginal ridge reduces the strength of the tooth and no restorative materials (Dental amalgam, Composite resin or Glass Ionomer Cement) can fully re-establish the original contact areas, contour and strength to the tooth.²

In recent years, a more conservative treatment approach called Minimally Invasive Dentistry(MID) has emerged. Minimally Invasive Dentistry deals with the diagnosis and treatment of tooth decay at microlevels. For the treatment of inter-proximal carious lesions, tunnel preparations, slot or box-only preparations are considered as minimally

invasive procedures. Of which, tunnel preparation is considered as an ultra-conservative treatment modality for the removal of proximal carious lesion, thus preserving the marginal ridge.³ Earlier, Glass Ionomer Cement(GIC) was the most commonly used restorative material of choice in tunnel preparations. But due to poor strength and esthetics of GIC, In recent years composite resin is the most preferred restorative material used in tunnel preparations.⁴ The aim of this case report is to present an ultra-conservative treatment modality of an interproximal carious lesion in a posterior tooth by composite resin restoration.

CASE REPORT

A 21-year-old female patient reported to the Department of Conservative dentistry and Endodontics. Triveni Institute of dental sciences,Hospital and Research centre. Bilaspur, with the chief complaint of food accumulation between her right lower posterior teeth since 2 months. Her past medical and dental history were

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not significant. On detailed clinical hard tissue examination, distal proximal carious lesion was detected on right mandibular 2nd premolar (Figure no.1) and the presence of carious lesion was again confirmed by a bitewing radiograph.

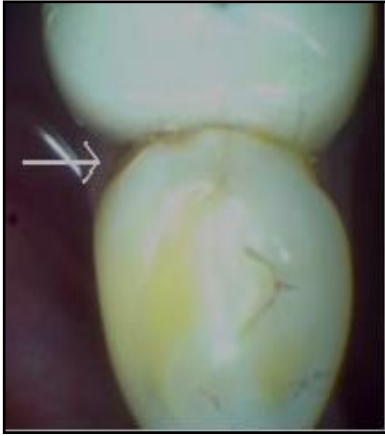


Fig 1: Distal proximal carious lesion in right mandibular 2nd premolar.

Before initiating the cavity preparation, tooth was evaluated properly to determine location and extent of caries lesion. It was also important to know that the access area does not involve any pulp horn. The carious lesion was approached through the occlusal surface in right mandibular 2nd premolar using No:2 round bur(Shofu Dental Corporation, CA, USA) with an airtor handpiece (NSK, Japan). Entry of the dental bur was 2mm inside the marginal ridge and the carious lesion was seen as a darkened area. Angle of the dental bur should be at 45 degree to the distal proximal carious lesion. With the distal proximal wall of the tooth left intact, the entire carious lesion was totally removed and the prepared cavity was then dried and etched with 37% phosphoric acid (Prime Dental products, Thane, Maharashtra, India) for 15 seconds. The etchant was totally removed by rinsing with water for 10 seconds and the tooth surface was dried to remove any excess moisture with a blotting paper, being careful to maintain a slightly moist surface. A light transmitting plastic wedge along with mylar strip matrix were used as barriers with that of its adjacent tooth. A fifth-generation dentin bonding agent (Single Bond Plus, 3M ESPE) was coated on all the walls of prepared cavity and gently air thinned and light cured for 20 seconds using a Bluephase C8 LED curing light (Ivoclar Vivadent) with a light intensity of 800 Mw/cm².

Composite resin restoration was done in incremental layering technique. Initially a layer of flowable composite resin (Filtek Flow Z350XT, 3M ESPE) was placed over the deeper dentin and light cured for 20 seconds using Bluephase C8 LED curing light (Ivoclar Vivadent), followed by the placement of nanofilled composite resin (Filtek Supreme Plus, 3M ESPE) in increments both in occlusal and on proximal surfaces and then light cured. Coarse aluminium oxide coated disk(GC Asia Dental Pvt Ltd, Hyderabad, India) was used for gross reduction of excess composite resin to establish proper contour and finer aluminium oxide coated disks(GC Asia Dental Pvt Ltd, Hyderabad, India) were used with polishing paste(Aster Compo, Prime Dental Products Ltd, Thane, India) to obtain smooth occlusal surface texture and well refined marginal adaptation of composite resin. On the distal proximal surface of the tooth, the composite resin restoration is finished and polished with coarse to finer grit abrasive strips(GC Asia Dental Pvt Ltd, Hyderabad, India) along with the use of polishing paste to obtain a smooth surface. The abrasive strips were used in to and fro motion. (Figure No: 2)

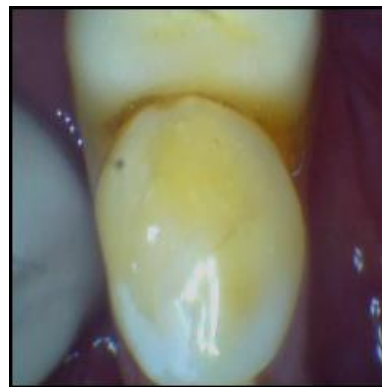


Fig 2: Finished composite restoration.

DISCUSSION

Due to the cuspal inter-digitation, the marginal ridge often acts as a centric stop and plays significant role in stabilizing the occlusion. Maintaining the marginal ridge prevents the proximal wear of restorative materials that may predispose to collapse of the proximal occlusion. The traditional approach for the treatment of proximal caries is more damaging to tooth causing excessive loss of sound tooth structure even for relatively small carious lesions. Removal of one

healthy marginal ridge in a tooth structure reduces the strength of the tooth by 30%.^{3,4} Alternatives to conventional Class II cavity preparation have been introduced over the years and Tunnel preparations had become popular in the 1980's. So, in the present case, Tunnel preparation with an ultra-conservative approach for the treatment of a proximal caries lesion with composite resin restoration was followed.

As the access to the proximal carious lesion is gained diagonally through the occlusal surface, the selection of appropriate angulated composite filling instruments contributes for the ideal and easy placement of the composite resin increments into the prepared cavity. The restoration of these proximal caries lesions might be challenging if macrofilled composite resin is used as the restorative material. The application of flowable composite in the deepest portion of the prepared cavity improves the marginal adaptation of restorative material to dentin. The remaining portion of the cavity is restored with nano-filled composite resin in increments.^{5,6}

Continuous developments in total-etch adhesive systems and improvements in the physical and mechanical properties of composite resins were responsible for a complete revolution in the field of restorative dentistry and the preservation of sound tooth structure is becoming the main goal in the modern day clinical practice of conservative dentistry.⁷

CONCLUSION

There is no need to sacrifice the excessive sound tooth structure for the treatment of relatively small proximal carious lesions. Logical attempt is to retain the sound tooth structure as much as possible by

minimally invasive treatment procedures. This technique can be considered as the most conservative alternatives to conventional class-II cavity preparation.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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