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(CASE REPORT)

A case report: Lithium disilicate overlay restoration on endodontically treated molar

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Abstract

Restorative techniques significantly influence the longevity and effectiveness of endodontically treated teeth, emphasizing the need for careful selection of materials and methods to ensure successful outcomes. Lithium disilicate is recognized for its superior aesthetic qualities and mechanical strength, making it an ideal choice for restorations in endodontically treated teeth. The versatility and durability of lithium disilicate make it suitable for various restorative applications, including crowns and veneers, in endodontically treated teeth.

The restoration of endodontically treated molars presents unique challenges, particularly regarding the preservation of tooth structure and achieving optimal aesthetic results. The use of lithium disilicate overlays addresses these challenges effectively, combining aesthetic appeal with the necessary strength to support the restored tooth structure.

Keywords: Endodontic Treatment; Overlay; Indirect Restoration; Lithium disilicate overlay

1. Introduction

Overlay restorations using lithium disilicate have gained popularity in restorative dentistry due to their aesthetic appeal, durability, and ability to preserve tooth structure. These restorations are particularly beneficial for teeth that have been compromised by caries or other structural issues [3]. The fracture resistance of lithium disilicate overlays is significantly affected by the preparation design. Studies have shown that traditional overlay preparations with anatomical occlusal reduction provide the highest fracture resistance compared to other designs like those with circumferential shoulder finish lines or central groove preparations [4].

2. Case Report

The patient came to Conservative Clinic at RSGMP-K Airlangga University with complaints of a cavity in the right lower back tooth uncomfortable because food often enters since the old filling came off. The patient wanted the tooth to be treated. The patient's tooth had a cavity ± 2 years ago, had been filled and then fell out. There have been complaints of pain, treated by the dentist's practice and has not been completed since the last 1 month. The patient claimed to have no history of drug allergy and food allergies.

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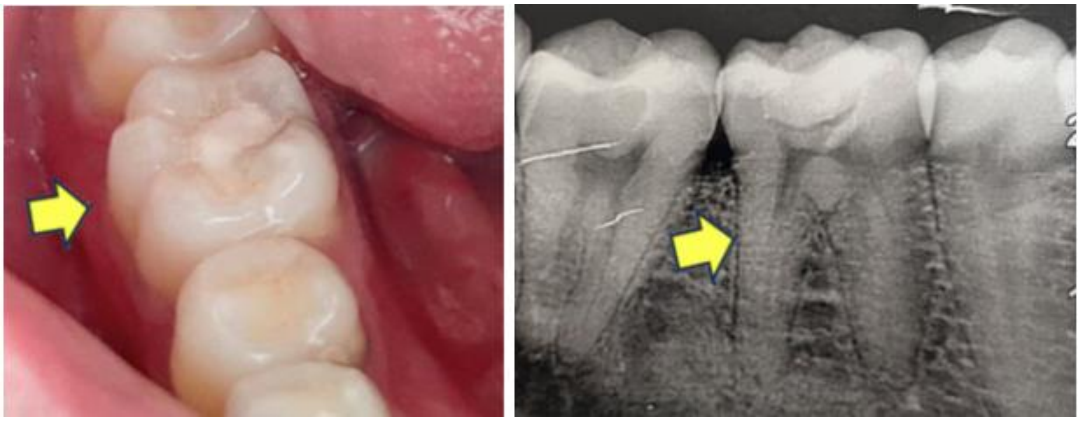

Figure 1 Initial clinical condition

Pretreatment examination (cold and pulp test) and diagnostic radiographic revealed previously initiated therapy in tooth #46. The patient complained sensitivity to percussion only on tooth #46. The treatment plan recommended is endodontic treatment on tooth 46 and restored with lithium disilicate Overlay. The pretreatment radiograph (Figure 2) revealed radiolucency indicating a cavity that extend until pulp chamber with an image of diffuse radiolucency image on the apical tip of the root.

3. Case Management

At the first visit the patient was carried out clinical examination and signed an informed consent before starting the treatment. For the endodontic treatment, the tooth was locally anesthetized with 2% lidocaine and 1:80,000 epinephrine, rubber dam isolation was ensured, and access opening was subsequently performed. The carious and decayed tooth structure was removed. Access cavity preparation was completed and refined using Endo-Access Bur (Dentsply, Maillefer, Baillaigues, Switzerland). Initial scouting of the root canal system was done with the DG-16 explorer and then with size 10 and size 15 K-files (Dentsply) until they displayed resistance. Four root canal orifices were located (two in the distal root and two in the mesial root) at the level of the cemento-enamel junction (CEJ). The canal orifices were coronally preflared with ProTaper Sx Gold (Dentsply Tulsa Dental Specialties, Tulsa) to improve access and provide better visualization.

The canals were irrigated with 2,5% sodium hypochlorite and 17% EDTA. Working length radiographs were taken to detect the presence of multiple canals. An apex locator (Propex Pixi, Dentsply) was used to verify the working length of all four root canals.

Biomechanical preparation of the canals was completed by Protaper Gold (Dentsply Tulsa Dental Specialties, Tulsa, OK) individually using a crown-down technique. Following chemico-mechanical preparation, the canals were dried with absorbent paper points. An intracanal calcium hydroxide dressing was placed, and the patient was scheduled for the next appointment one week later. The intracanal dressing was removed at the second appointment, and copious irrigation was performed. Final irrigation with 17% EDTA to remove the smear layer, followed by 2.5% sodium hypochlorite, was performed before obturation. The Endoactivator (Dentsply Tulsa Dental Specialties, Tulsa, OK) was used to actively irrigate the canals with 2.5% sodium hypochlorite and 17% EDTA, alternating with normal saline. Obturation was accomplished using a single cone technique and AH plus Bioceramic as a root canal sealer (Dentsply Maillefer). A temporary filling (Cavit G, 3M ESPE) was placed, and the patient was kept on follow-up visits. At one week of follow-up, the patient was completely asymptomatic. Core build up was made using fiber reinforced composite (everX Posterior, GC SEA). The tooth was restored with all porcelain overlay crown. Overlay preparation was conducted by removing all carious tissue with round diamond bur, and reducing occlusal surface as much as 1,5 mm. Chamfer margin was made using round end fissure bur.

Figure 2 Periapical radiograph trial gutta percha and obturation

Figure 3 Core build up

Figure 4 Preparation

Figure 5 Insertion overlay crown

4. Discussion

Endodontically treated teeth are more susceptible to fracture when compared to healthy teeth, due to endodontically treated teeth experiencing large amounts of tooth tissue structure loss, decreased dentin elasticity, the influence of irrigating agents and chelating agents that can dissolve inorganic components of dentin structure, thereby reducing the microhardness of endodontically treated teeth [5,6]. Tooth decay due to the dental caries process and the reduction of the thickness of the remaining tooth tissue during endodontic treatment can affect the long-term prognosis of the tooth [5].

Posterior indirected adhesive restorations (PIARs) are commonly used in cavities with widespread coronal destruction. The preparation of adhesive restorations preserves healthy tissue to a greater extent than the preparation of full-crown metal-free restorations. Based on the cavities that need to be restored in posterior teeth, there are several forms, namely inlays (cavities that do not require cuspal coverage), onlays (cavities with coverage of 1 or more of the cusps), overlays (specific onlays with overall cuspal coverage). The use of adhesive restorations provides several advantages, including conservative, sealing, function and aesthetics. The indirected approach is indicated because of the need for cuspal coverage (one or two bony) to increase the strength of the remaining tooth tissue [7,8].

In an effort to protect the tooth that has been weakened, it is recommended to cover the tooth bony with partial or complete restoration [8]. Reeh et al said that teeth with 3 wall cavities (mesio occlusal/MO or occlusodistal / OD) experienced a stiffness loss of 45%, compared to endodontic cavities mesioclusodistal/MOD experiencing a stiffness loss of 63%. Teeth that have undergone endodontic treatment with moderate level damage (MO or DO cavities) with thin axial walls of <2mm are indicated for onlay or overlay adhesive restorations [8]. The occlusal reduction required for resistance to functional load in overlay preparations is 1.5-2 mm. The occlusal reduction depends on the thickness of the restoration material with a minimum thickness of 1-2 mm, the wall should be reduced until the enamel is supported by healthy dentin, the wall thickness is measured to ensure the presence of resistance. Dietschi and Spreafico suggest a central isthmus of not less than 2 mm for restoration resistance especially after cementation. Determination of occlusion contact is important to prevent placement of preparation margins when occlusal contact occurs [7].

Several examinations are required before making the final restoration, namely soft tissue examination (swelling of surrounding tissues, sinus tract), palpation, percussion (determining the presence of inflammation in the periodontal tissues, which can be related to trauma, premature contact, periodontal disease or extension of pulp disease to the periodontal ligament), mobility test (determining the condition of periodontal tissues), measuring the depth of periodontal pockets, pressure test, radiographic examination (showing the anatomical condition of surrounding, development and healing of periapical tissues), if it shows good results restoration can be produced [9].

5. Conclusion

Composite indirect restorations with cuspal coverage can improve the success long-term prognosis of endodontic treatment of tooth fractures. Teeth that have undergone endodontic treatment often fracture easily, requiring restorations that can replace the lost dentin. Composite resin has a modulus of elasticity that resembles dentin which can absorb stress or occlusal load and has good strength against fracture.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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