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Importance of Coronal Seal: Preventing Coronal Leakage In Endodontics

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Abstract: *The primary goal of endodontic treatment is to keep the pulpal space free of microorganisms and to prevent recurrent infection. Oral bacteria and their by‑products can penetrate this space if there is inadequate coronal or apical seal. Microbial contamination through the occlusal surface, leading to coronal leakage constitutes a large percentage of failed root canal treatments. The purpose of this article is to highlight the clinical and biological implications of coronal leakage and the means to prevent the same.*

Keywords: *coronal leakage, intra-orifice barrier, IRM,Resilon, smear layer*

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I. Introduction

Pulpal and periradicular diseases develop when microorganisms and/or their by-products contaminate these tissues. Therefore, a major goal of endodontics is to prevent penetration of microorganisms into the pulpal space and root canal system.[1] There are a number of methods to enhance the coronal seal including intra-orifice barriers, temporary and permanent restorations and some root canal irrigants with substantive antimicrobial activity (i.e., chlorhexidine).[2]

II. Etiology

Coronal leakage can occur in the following instances:

1. Delay in placement of coronal restoration following root canal treatment.
2. Compromised or inadequate temporary filling.
3. Tooth fracture.
4. Leakage during post placement.
5. Failure of final restoration.
6. Recurrent decay at restoration margins

III. Methods to Reduce Coronal Leakage

There are several ways to reduce coronal leakage as follows:

3.1 Case selection

The endodontic treatment should be done only if the tooth is restorable.If the post-endodontic restoration fails, coronal leakage can lead to endodontic failure. As a thumb rule, at least 2 mm of sound tooth structure must be present circumferentially for ferrule effect.

3.2 Pre-endodontic tooth preparation

Ensure complete removal of caries or defective restorations and examination of tooth structure for cracks or fractures before starting the endodontic treatment. A pre endodontic build-up of the missing walls in

the coronal structure should be done as it strengthens the tooth, provides better isolation, helps better stabilization of rubber dam clamps and limits microbial ingress.

3.3 Cleaning and shaping of root canals

A thorough cleaning and shaping with copious irrigation are mandatory to prevent leakage. The presence or absence of a smear layer may play an important role in the adhesiveness of some sealers to the root canal walls. Gettleman*et al.*, demonstrated that smear layer removal significantly increased adhesive strength and resistance to microleakage of AH-26 sealer.[3]Smear layer removal is best achieved by irrigating the canals with NaOCL(sodium hypochlorite) followed by 17% EDTA solution.[4]Due to antimicrobial substantivity of CHX, it seems that CHX preparations delay microleakage into the root canal.[5]

3.4 Obturation

The purpose of the obturation is: to prevent microorganisms from re-entering the root canal system and to isolate any microorganism that may remain within the tooth. Zinc oxide eugenol and calcium hydroxide sealers exhibit solubility thus aiding leakage. On setting, shrinkage of the resin sealer allows it to pull away from the gutta- percha core, thus creating a microgapthrough which bacteria can pass.[6]None of the sealers are able to bond to the guttapercha core material. Sealers such as Epiphany and Realseal. Studies have shown that leakage of bacteria with resilon is significantly reduced compared with guttapercha.[7] Resilon demonstrated an increase in root strength than guttapercha.[8]

3.5 Temporory restoration

Commonly used temporary filling materials arecavit, IRM and zinc phosphate. The cotton must be minimal and placed securely into the access cavity prior to placement of the filling to prevent a potential lifting or dislodgement of the temporary material. A minimum 4–5 mm thickness of temporary restoration is recommended to prevent leakage.

3.6 Timing of permanent restoration

The restoration of an endodontically treated tooth should commence as soon as possible after root canal treatment. Ensure the tooth is in atraumatic occlusion.

3.7 Choice and integrity of permanent restoration

The presence of adequate ferrule at the crown- root interface is critical for the long- term success of the crowned endodontically treated tooth. The ferrule is the circumferential ring of sound tooth structure that is enveloped by the cervical portion of the crown. A minimum 2 mm of ferrule provides a bracing or hugging action to improve the integrity of the endodontically treated tooth.[9]This in turn helps in retaining an adequate coronal seal.

The clinician should ensure that the permanent restoration does not violate the biologic width. If it is hampered, the patient will not be able to keep that area clean, leading to plaque accumulation, recurrent decay and subsequently coronal leakage.The Nayyar core or bonded corono- radicular dowel and core technique serves as an effective postendodonticrestoration.[10] In this technique, 2–4 mm of gutta- percha is removed from coronal portion of each canal. A restorative material like amalgam or composite resin is condensed into the root canals, pulp chamber, and the coronal portion of the tooth. Such type of restoration enhances the retention and resistance features and also limits coronal leakage.A sandwich technique postendodontic restoration with GIC base and overlaying composite restoration is also an effective restoration. The GIC base also serves to seal the accessory canals in the furcation area of molars.

3.8 Post and core

If indicated, parallel, serrated, and threaded posts are preferred as they are able to distribute forces more evenly along the root. Postspace preparation should be done under isolation with a rubber dam to prevent contamination. Post placement should be done immediately after postspace preparation. Prefabricated posts are preferred to custom posts as they can be cemented immediately. Core build up should be done as soon as possible after post cementation.

3.9 Long term follow up

The concerned tooth should be evaluated for signs and symptoms, integrity of permanent restoration, the presence of recurrent decay and apical pathologies. A root canal treated or pulpless tooth does not have any sensory innervation. Hence, leaking coronal restorations may go unnoticed for months since the patient does not feel pain or sensitivity. By the time, it gets noticed, the damage is already done.

IV. Conclusion

Coronal leakage can occur at any time right from the beginning of endodontic treatment, till the postendodontic restoration is completed. The lesser the time duration between access cavity preparation and permanent restoration, the lesser will be the leakage. Basic precautions taken during every step of treatment can prevent this complication and ensure endodontic success.Thus, coronal leakage is like a silent killer, which sneaks in unobtrusively and causes extensive damage. An awareness of the biological and clinical implications along with adequate precautions can help to overcome this hurdle

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Conflicts of interest
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References

[1]. Coronal leakage: Clinical and biological implications in Endodontic Success, American Association of Endodontics 2002.
[2]. Z. Mohammadi, M. Khalesi,*On the importance of coronal seal in Endodontics, International Journal of Clinical Dentistry ISSN: 5(3)*, 2012, 1939-5833.
[3]. GettlemanBH, Messer HH, El Deeb ME, Adhesion of sealer cements to dentin with and without the smear layer,*J. Endod.*, 1991, 17: 15-20.
[4]. Vassiliadis L, Liolios E, Kouvas V, Economides N, Effect of smear layer on coronal microleakage, *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod*, 1996, 82: 315-320.
[5]. Gomes BP, Sato E, Ferraz CC, Teixeira FB, Zaia AA, Souza-Filho FJ, Evaluation of time required for recontamination of coronally sealed canals medicated with calcium hydroxide and chlorhexidine,*Int. Endod. J.*, 2003, 36: 604-609.
[6]. Chailertvanitkul P, Saunders WP, MacKenzie D, An in vitro study of the coronal leakage of two root canal sealers using an obligate anaerobe microbial marker, *Int. Endod. J.*, 1996, 29: 249–255.
[7]. Gregori Kurtzman, Improving endodontic success through coronal leakage prevention, Endo Tribune U.S. Edition.
[8]. Onay EO, Ungor M, Orucoqlu H, An in vitro evaluation of the apical sealing ability of a new resin resin-based root canal obturation system, *J Endod* 2006 Oct; 32(10):976-8.
[9]. SM Baba, SI Grover, V Tyagi, Fracture resistance of teeth obturated with Guttapercha and Resilon: An in vitro study, *J Conserv Dent*. 2010 Apr-Jun; 13(2): 61-64.
[10]. Nayyar A, Walton RE, Leonard LA, An amalgam coronal-radicular dowel and core technique for endodontically treated posterior teeth,*J Prosthet Dent*, 1980, 43:511-5.

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