

CASE REPORT

Intermediate Restorative Material: As A Retrograde Filling Material

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ABSTRACT

The purpose of this report is to evaluate intermediate restorative material as a root-end filling material and its healing ability over a period of 5 years. X, a 24-year-old female, came to the OPD of RUHS College of Dental Sciences, Jaipur, with a chief complaint of pus discharge from the anterior palatal region for the last 2–3 months. The patient gives a history of trauma 8 years back, but the patient had not reported at that time. 2–3 years after that pus started coming out from labial vestibule with respect to the upper anterior tooth. The patient got done root canal treatment by a dentist at that time. After that patient was asymptomatic for some time, then 2–3 months later patient started having pain and pus discharge from the anterior palatal region. Medical history was not relevant.

Keywords: Endodontic surgery, Intermediate restorative material, Root-end filling material.

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INTRODUCTION

The principal aim behind an endodontic treatment is to eliminate microorganisms from the root canal system and fill the intracanal space with proper materials to achieve a hermetic seal between root canal system and periodontium. This hermetic seal prevents colonization of bacteria that could maintain or promote a periapical pathosis.

In modern dentistry, due to improvements in instruments and techniques, the efficiency of biomechanical preparation of root canal has significantly improved. Leading to the increased success rate of conventional root canal therapy up to 90%.^[1]

In some cases, conventional endodontic treatment and retreatment are not efficient enough the underlying etiology and a surgical endodontic intervention is required which includes surgical debridement of periapically infected area, root end resection, root end preparation, and sealing the root end with the retrograde filling material.

According to Gartner and Dorn,^[2] an ideal material for the purpose of sealing the root-end preparation should have the ability to prevent the microleakage of microbes and their by-products into the periradicular tissues. It should also possess the properties of being nontoxic, noncarcinogenic, and biocompatible with tissue fluids and should also be dimensionally stable. The sealing ability of material should not be affected by moisture. Practically, it should provide ease of use and should be radio-opaque enough, to be recognised on radiographs.

A number of materials can be used for the purpose of root-end filling, and we used intermediate restorative material (IRM) for the same. IRM is basically zinc oxide eugenol cement containing 20% polymethylmethacrylate by weight to the powder.^[3]

CASE REPORT

24-year-old female, reported to the OPD of Department of Conservative Dentistry and Endodontics Government Dental College and Hospital, Jaipur, India, complaining of pus discharge from the anterior palatal region for the last 2–3 months. There was a history of trauma 8 years back, but the patient had not reported at that time. 2–3 years after that pus started coming out from labial vestibule with respect to upper right central incisor tooth. The patient got done root canal treatment of respective tooth by a dentist at that time. After that patient was asymptomatic for some time, then 2–3 months later patient started having pain and pus discharge from the anterior palatal region. On extraoral examination, there was no significant swelling. Intraoral examination revealed discolored central incisor of the

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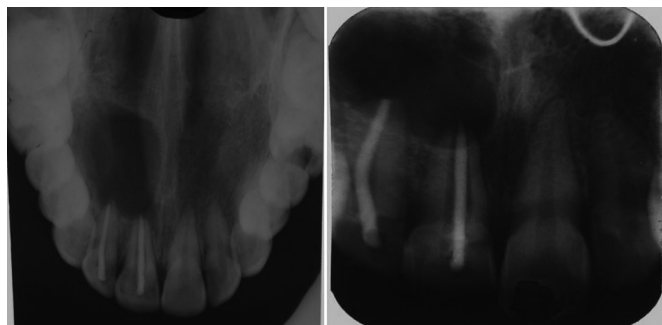
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first quadrant and tender upper right central, lateral incisor, and canine and Grade 1 mobile upper right central, lateral incisor and canine. Overlying mucosa in relation to upper central and lateral incisor was also tender on palpation. Intraoral periapical radiograph revealed periapical radiolucency with respect to central incisor, lateral incisor, and canine. There was no related medical history.



After all, this diagnosis was made, and surgery was planned with respect to central, lateral incisor, and canine with IRM as a retrograde filling material.

SURGICAL PROCEDURE

At the initial presentation, we assessed the level of oral cleanliness before surgery, and the patient was referred to the periodontics department for oral prophylaxis. The procedure was performed under local anesthesia. Infraorbital block was given on the right side using 1.8 ml of lignocaine of 2% concentration containing 1:100,000 epinephrine (Lignocain; Hindustan Pharmaceutical Barauni, India) and palatal infiltration was given with respect to the apices of upper right central incisor, lateral incisor, and canine and adjacent tooth with 0.5 ml of 2% lignocaine with 1:100,000 epinephrine (Lignocain; Hindustan Pharmaceutical Barauni, India) to involve the entire surgical site.

A full thickness flap was retracted following an intramuscular incision using a no. 15 surgical blade. With no. 15 surgical blade a vertical incision was made to create a rectangular flap. The tissues exposed by the reflection of the flap were kept moistened with sterile saline throughout the surgery to avoid the bone or the soft tissue flap from drying out.

After retraction of the flap, the amount of facial bone associated with the tooth to be treated was assessed. A thin bony plate over the apex was removed gently with curettes.

An assessment was made for any bony defect at the apex of the tooth, and soft tissue debris was removed after root-end resection. A 3 mm root end resection was carried out almost perpendicular to the long axis of the root by means of a fissure bur in a low-speed handpiece with copious irrigation using sterile saline, and the

root canal was prepared in a box-type manner with a No. 33.5 inverted cone bur.

All preparations were undertaken with a copious amount of coolant, using sterile saline solution. The water was allowed to run passively in the root-end cavity for 2 min to allow maximum opportunity for cleaning of the root canal wall.

The root end was dried with a low-pressure compressed air source, and IRM was filled in the cavity. When the root end cavity was filled, the packing in the bony crypt was removed, and the surface of the cut root end was cleaned with a cotton wall pledget dampened with sterile saline. The tissue at the surgical site was rinsed with a sterile normal saline solution, avoiding washing the IRM from the root end. The soft tissue was then approximated using 3-0 Black Mersilk Suture. Firm pressure was then applied to the tissues with a gauge swab dampened with sterile saline for 5–10 min to ensure close adaptation of the soft tissue to the bone and access cavity was filled with glass ionomer cement on the same sitting.

Radiographic examination was performed before surgery, 1 week after the surgery, 6 months after



Figure 1: 7 days post-operative



Figure 2: 6 months post-operative



Figure 3: 1 year post-operative



Figure 4: 5 years post-operative

surgery, 1 year after surgery, and 5 years after surgery. Radiographs were taken using Long Cone Paralleling Technique.

Clinical sign of healing was lack of symptoms including pain, absence of tenderness on percussion of the involved tooth, absence of tender to palpation of the soft tissue near the apex, absence of swelling and fistula, and absence of excess tooth mobility.

Radiographic sign of healing was the absence of periradicular radiolucency and formation of the periodontal ligament space of normal width [Figures 1-4].

DISCUSSION

The purpose of the retrofilling material is to provide an apical seal that inhibits the leakage of irritants from the root canal system to the periradicular tissues.^[4]

Many materials have been mentioned to be used as root-end filling materials, including amalgam, gutta-percha, zinc oxide-eugenol, reinforced ZOE composite resin, and gold foil.^[5]

Amalgam has been the most frequently used retrograde filling material, but it has a number of

disadvantages such as initial marginal leakage, corrosion, tin and mercury contamination of periapical tissues, moisture sensitivity of some alloys, need for retentive undercut preparation, staining of hard and soft tissues and technique sensitivity,^[2] scattering of amalgam particles into the surrounding tissues, corrosion, and setting properties which allow dimensional changes and fluid leakage. If the proper seal has to be obtained varnish should be used otherwise the moist environment during setting will cause microleakage.^[4] Studies also show that freshly mixed amalgam is very cytotoxic due to unreacted mercury.^[6]

Thermoplastic gutta-percha can also be used as a retrograde filling material. It is reported that thermoplasticized gutta-percha has better sealing ability than amalgam with and without varnish.^[7] Due to its porous matrix, it has tendency to absorb moisture from surrounding periapical tissue resulting in initial expansion, followed by contraction at a later stage. It can cause poor marginal adaptation and also increased microleakage.

Gold foil was first reported as a retrofilling material in Schuster and Lyons in 1913 and 1920, respectively. It showed improved marginal adaptability, tissue biocompatibility, and surface smoothness.^[8] It's not practically possible to use of gold foil as a root-end filling material often because of the requirement to provide an environment which is moisture free, careful handling, placement, and finishing of materials. However, it can be justified when used in isolated cases.^[8]

Due to cytotoxic or irritating effects of composites on pulp tissue they have received minimal attention as root-end filling materials.^[8] However, light cure composite resin showed significantly decreased apical leakage than amalgam and ketac-silver.^[9] McDonald and Dumsha compared composite with different materials such as dentin bonding agent, composite alone, cavity, amalgam, hot burnished gutta-percha, and cold burnished gutta-percha and found that composite with dentin bonding agent showed the least amount of leakage followed by composite alone when both of these were placed directly on resected root surface.^[10] This shows that composite resin can be used as a retrograde filling material, but further research on this topic is needed.

According to Gartner and Dorn,^[2] an ideal material to seal the root end cavities should prevent the microorganisms and their byproducts into the periapical tissues. It should be nontoxic, noncarcinogenic, and biocompatible with the tissue fluids, non-resorbable, and dimensionally stable. The setting should not be affected by the presence of moisture, which is a main issue when one thinks about periapical area. The material should have sufficient radio opacity to be recognized on radiograph. IRM as a retrofilling material has most of these

properties except one or two. IRM has 80% zinc oxide, 20% polymethylmethacrylate, with the liquid accounting for 99% of eugenol. A thick mix of IRM improves ease of root-end placement and does not adversely affect the sealing properties. IRM does not have tendency to adhere well to itself and should thus be inserted as a single mass and condensed rather than placed incrementally. IRM has excellent sealing ability and is nontoxic after setting. Studies reveal that IRM sealing capability is better than nonzinc amalgam.^[11] In comparison to silver amalgam, IRM showed lesser leakage.^[12] Studies also showed super EBA induces good healing response with a minimal amount of chronic inflammation at the root apex.^[13]

Trope *et al.*^[14] in a histological study confirmed the good tissue response to IRM.

CONCLUSION

The choice of an appropriate root-end filling material is one of the many factors critical to the long-term success of the peri-apical surgery. In our 5 years long follow-up, IRM is proved to be a very good retrograde filling material, and it poses very little effect on healing of the tissues after removal of periradicular infectious pathosis. It has many properties of the material which can be ideally used for retrofilling except a one or two, but we prefer it as a retrograde filling material.

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