Access this article online

Quick Response Code:

Website: www.sidj.org

DOI: 10.4103/2454-3160.177954

Intraradicular rehabilitation of upper central incisors

Mandeep Duarah, N. Vimala, Lalitagauri Mandke

Abstract:

Apexification can be defined as a "method to induce a calcified barrier in a root with an open apex or the continued apical development of teeth with incomplete roots and a necrotic pulp" (American Association of Endodontists 2003). The unpredictable and often lengthy course of this treatment with calcium hydroxide presents challenges. This necessitates one visit apexification with mineral trioxide aggregate as it combines biocompatibility, and a bacteriostatic action, with favorable sealing ability.

Key words: Apexification, mineral trioxide aggregate, periapical lesion

One of the main aims of root canal treatment is to completely fill the root canal system to prevent re-infection. Teeth where there is incomplete root development as a result of pulp necrosis through trauma or caries, the absence of a natural constriction at the end of the root canal makes control of filling materials difficult. Because of the absence of an apical constriction, apexification has been advocated as an alternative to standard root canal treatment.

Apexification can be defined as a "method to induce a calcified barrier in a root with an open apex or the continued apical development of teeth with incomplete root and a necrotic pulp."[1]

Case Report

A 31-year-old male patient with a noncontributory medical history reported to the Department of Conservative Dentistry and Endodontics complaining of the discolored prosthesis in his upper front tooth region. Oral examination revealed faulty prosthesis and excessive loss of coronal tooth structure with labial perforation in relation to 11, 21 [Figure 1].

Radiographic findings showed incompletely condensed Gutta-percha in 11, 21 with periapical radiolucency suggestive of chronic periapical periodontitis [Figure 2].

Cone beam computed tomography findings showed internal and external resorption in relation to 11, 21 with periapical periodontitis [Figure 3].

In the first visit, the access cavity was re-opened in relation to tooth 11 and 21. Improperly condensed Gutta-percha was removed from both the teeth using peeso reamer size #1 and #2, RC solve (prime dental product) and H-files size #20 and #25 [Figure 4].

Working length for both the teeth was established using radiographic method [Figure 5]. Biomechanical preparation was carried out using 80-size k-file in circumferential manner using the conventional technique. Both the canals (11 and 21) were disinfected using 5% sodium hypochlorite and normal saline. An intracanal medicament, calcium hydroxide (RC Cal [prime dental product]) was placed in both the canals after drying the canals with paper points, and the patient was recalled every week for the next 2 weeks. Access cavity was sealed with zinc oxide eugenol cement.

Calcium hydroxide dressings were repeated for two more sittings until there was no exudate from the canals. Calcium hydroxide was flushed out of the canal using 5% sodium hypochlorite and normal saline, and then the canals were

Department of Conservative Dentistry and Endodontics, Padmashree Dr. DY Patil Dental College, Navi Mumbai, Maharashtra, India

Address for correspondence:
Dr. Mandeep Duarah, 51/203 EMP Halley CHS Ltd., Thakur Village, Kandivali East, Mumbai - 400 101, Maharashtra, India.
E-mail: mandeep23b@gmail.com

How to cite this article: Duarah M, Vimala N, Mandke L. Intraradicular rehabilitation of upper central incisors. Saint Int Dent J 2015;1:130-3.

Figure 1: Preoperative image

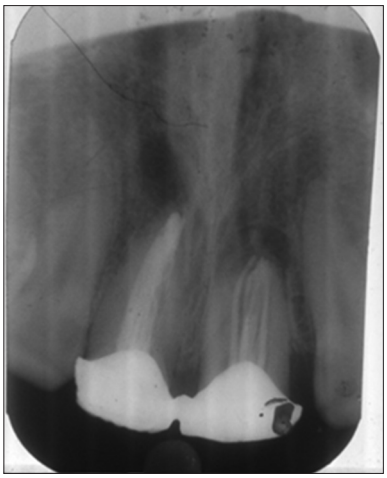

Figure 2: Preoperative radiograph

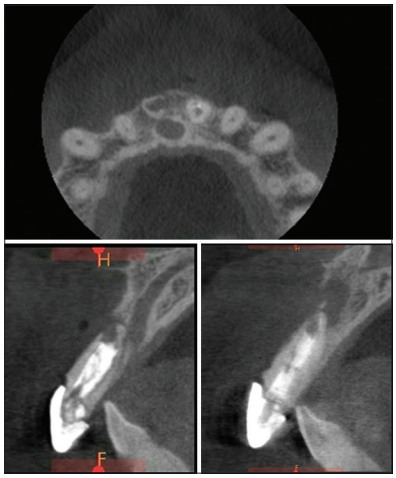

Figure 3: Cone beam computed tomography images

Figure 4: X-ray after Gutta-percha removal

dried using paper points. Apexification with mineral trioxide aggregate (MTA) was planned.

PRO ROOT® MTA (Dentsply/Tulsa Dental, Tulsa, OK) was mixed according to manufacturer's protocol and carried to the apical area with an Amalgam carrier. MTA was positioned precisely at the foramen with the help of a customized thick Gutta-percha cone, which was tightened 2 mm shorter than the working length; it was used as a verifier and also as an MTA plugger. The thickness of the apical plug was 7 mm [Figure 6].

The extension of the apical plug was verified radiographically. A moist cotton pellet with sterile water was then placed in the pulp chamber, and the access cavity was closed with zinc oxide eugenol temporary filling material.

After a week, zinc oxide eugenol and cotton pellet were removed, and the setting of MTA was gently tested. The canals were reinforced with a fiber post. PARACORE® (Coltene/Whaledent) was used to lute the posts to the canal wall. A tertiary monoblock (three interfaces) was formed in the root canals. Core was built with composite resin [Figures 7 and 8].

Discussion

The most common sequelae of pulp necrosis are periapical lesion either due to carious involvement or trauma. Treatment options to manage a large periapical lesion with an open apex vary from nonsurgical root canal treatment and/or apical surgery to extraction. Complete removal of debris from the root canal and periapical tissue is not always possible, hence dressing with chemical medicament has been considered as one of the most important steps to obtain and maintain sterile root canal after mechanical instrumentation before root canal onturation.

Current philosophy includes use of nonsurgical root canal treatment. The duration of the therapy in classic apexification technique with calcium hydroxide is too long, which is from 3 to 21 months.[2]

MTA appear to show superior sealing ability,[3] good marginal adaptation,[4] a high degree of biocompatibility[5] and a reasonable setting time (approximately 4 h). Obturation of open apex teeth with MTA overcomes the defects of conventional

Figure 5: Working length X-ray

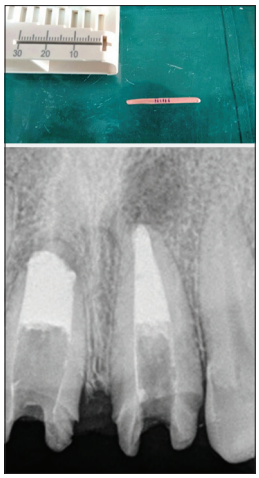

Figure 6: Modified Gutta-percha cone used as a mineral trioxide aggregate plugger and the apical plug of mineral trioxide aggregate

Figure 7: Fiber post cementation and all ceramic crowns placed

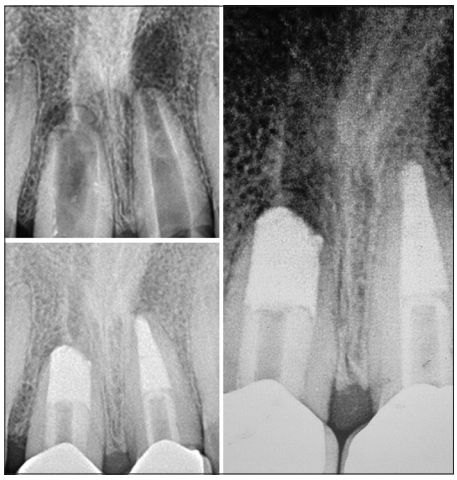

Figure 8: Before, 9 months evaluation and 16 months evaluation

apexification procedures. MTA is nonirritating to periapical tissues, induces the regeneration of cementum and periodontal ligament and also provides an effective seal against dentin and cementum. MTA stimulates the periradicular/periodontal tissue repair. The success rate of apexification with calcium hydroxide is approximately79–96%, MTA demonstrated healed rates of 81–100%.[6]

In vitro testing of Gutta-percha obturations using dye penetration, fluid filtration, or bacterial leakage models shows vulnerability. Bacterial challenges, to exposed Gutta-percha with sealer in various *in vitro* experimental models have shpwn leakage along the material within 3–30 days. Although Gutta-percha shows many important advantages such as ease of use, handling properties, and biocompatibility, it exhibits inherent weakness that makes it less than ideal. The susceptibility of Gutta-percha to contamination and microleakage has led to the recommendation that sealed coronal material be placed directly after the completion of orthograde root canal treatment when using Gutta-percha.

Endodontically treated teeth which have been subjected to long-term microleakage, and bacterial contamination can show improved healing rates without surgical intervention by using MTA obturation when compared with Gutta-percha re-obturated teeth. Root canal treated teeth that have been obturated with MTA exhibit higher fracture resistance. Long-term placement of MTA in the canal system not only provides increased resistance to fracture, but the strength of the tooth might increase with time. MTA can be used in the presence of moisture in the root canal, this property is especially important in teeth with necrotic pulp and periapical lesions as one of the complications in these cases is the presence of exudate at the apex of the root. However, the application of MTA mixture should be preceded by a temporary calcium hydroxide dressing to limit bacterial contamination.[7]

Conclusion

Taking into account the importance of apical seal, MTA can be considered as an effective material for apical plugging in

permanent teeth with open apices with periapical lesions.[2] MTA is found to be superior to calcium hydroxide as the time duration for apical closure is lesser with the former. Single visit apexification with a biocompatible material like MTA is beneficial in the effective management of teeth with open apex.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References

1. Pace R, Giuliani V, Pini Prato L, Baccetti T, Pagavino G. Apical plug technique using mineral trioxide aggregate: Results from a case series. Int Endod J 2007;40:478-84.
2. Govila S, Govila V. Mineral trioxide aggregate as an apical plug for apical closure and periapical healing – A case report. Endodontology 2010;22:63-7.
3. Binnie WH, Rowe AH. A histological study of the periapical tissues of incompletely formed pulpless teeth filled with calcium hydroxide. J Dent Res 1973;52:1110-6.
4. Torabinejad M, Watson TF, Pitt Ford TR. Sealing ability of a mineral trioxide aggregate when used as a root end filling material. J Endod 1993;19:591-5.
5. Torabinejad M, Smith PW, Kettering JD, Pitt Ford TR. Comparative investigation of marginal adaptation of mineral trioxide aggregate and other commonly used root-end filling materials. J Endod 1995;21:295-9.
6. Kumar R, Patil S, Hoshing U, Medha A, Mahaparale R. MTA apical plug and clinical application of anatomic post and core for coronal restoration: A case report. Iran Endod J 2011;6:90-4.
7. Bogen G, Kuttler S. Mineral trioxide aggregate obturation: A review and case series. J Endod 2009;35:777-90.