ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2023; 9(3): 392-395

www.oraljournal.com
Received: 07-07-2023
Accepted: 13-08-2023

Dr. Soham Datta
Assistant Professor, Department of Conservative Dentistry & Endodontics, Haldia Institute of Dental Sciences & Research, Haldia, West Bengal, India

Dr. Anirban Bhattacharyya
Professor & HOD, Department of Conservative Dentistry & Endodontics, Haldia Institute of Dental Sciences & Research, Haldia, West Bengal, India

Dr. Asim Bikash Maity
Professor, Haldia Institute of Dental Sciences & Research, Haldia, West Bengal, India

Corresponding Author:
Dr. Soham Datta
Assistant Professor, Department of Conservative Dentistry & Endodontics, Haldia Institute of Dental Sciences & Research. Haldia, West Bengal

Unintentional extrusion of Mineral Trioxide Aggregate into the periapical lesion during Apexification: A case report.

Dr. Soham Datta, Dr. Anirban Bhattacharyya and Dr. Asim Bikash Maity

DOI: https://doi.org/10.22271/oral.2023.v9.i3f.1832

Abstract
The complete growth of roots along with complete apical closure occur within 3 years of tooth eruption. In this period, the management of pulpal injuries poses a serious problem for the dentist. The importance of appropriate clinical examination and endodontic diagnosis in the treatment of immature teeth cannot be overstressed. The best treatment for nonvital teeth is Apexification Where the root ends were closed to create better conditions for the conventional root canal fillings. The most common material for sealing open apex is calcium hydroxide, but recently there has been interest in the use of mineral trioxide aggregates (MTA). This article describes a case report of the successful use of MTA in the apical repair of an open apex tooth.

Keywords: Apexification, mineral trioxide aggregate, young permanent teeth.

Introduction
Apexification is defined as the method to induce a calcific barrier across an open apex of an immature pulpless tooth. It is most commonly performed in traumatized incisors or Carious exposure due to which they have lost their vitality in between their root development.
Apex of young permanent teeth has two types of morphological variation, Divergent apex (Blunderbuss apex) and parallel to convergent apex. In both cases conventional root canal treatment can not be performed due to the problems of material extrusion and poor apical seal of obturation. An apical barrier is much required for proper obturation of the root canal system [1].
Kaiser, who first introduced the use of calcium hydroxide in 1964, said that mixing this product with camphor-p-chlorophenol (CMCP) caused the formation of hard tissue barrier at the apex. Different materials (camphor, distilled water, saline, anesthetic solution, chlorhexidine etc.) can be mixed with calcium hydroxide to promote calcific barrier at the apex [2]. However, the time required is variable and ranges from 3-18 months. This causes problems in patient compliance, re-infection due to loss of temporary filings, and tooth damage.
Two-stage apicectomy can eliminate these problems. It involves placement of a biocompatible material at the apex of the root canal thereby creating an apical stop and promotes immediate filling of the root canal. MTA is considered a good material for this procedure because of its good root closure properties, biocompatibility, and ability to support reconstruction of pulp and periradicular tissues [3]. This case demonstrates that there were no such problems observed when MTA was applied as a root end barrier and unintentionally overfilled into the periapical lesion.

Case report
A 29 year- old male patient reported to the Department of Conservative Dentistry and Endodontics, Haldia Institute of Dental Sciences & Research with a chief complaint of pain & discomfort in his upper left central incisor (21). On asking precisely patient gave a history of trauma associated with upper left central incisor twenty years back. On clinical examination,

No discoloration and fracture in permanent maxillary left central incisor was evident. The concerned tooth did not respond to electric pulp test. Radiographic examination showed incomplete root formation with wide open apices (Blunderbuss canal) and a periapical radiolucency for the same tooth (Figure 1). Based on clinic-radiographical examination a diagnosis of immature nonvital tooth with periapical radiolucency i.r.t upper left central incisor was made. Although in radiographic examination the periapical radiolucency of permanent maxillary left central incisor also involved the permanent maxillary left lateral incisor but since it responded normally to electric pulp test, so the treatment of two steps of Apexification with calcium hydroxide dressing was planned for the permanent maxillary left central incisor alone.

After application of local anesthesia, access cavity preparation was made under rubber dam isolation using a no.2 round bur (Mani, Japan). Apex locator (Canalpro, Coltene, Switzerland) showed improper canal length reading so a radiograph was done to confirm the actual working length (Figure 2). The working length was obtained with 80 k file. At this stage, the number 80 file was not s fitted tightly into the canal and easily passing over the apex. Minimum instrumentation using hand files was done and the canal was thoroughly cleaned using 30 gauge side vented needle with 5% hypochlorite (Parcan, Steptodont, India) solution. To reduce the load of bacteria into the canal prior to MTA placement, Water based calcium hydroxide (Neocal, Neoendo, Orikam, India) was placed (Figure 3) in the canal and temporized (Neotemp, Orikam, India). The patient was asked to return after a week for second visit (Figure 4).

On second visit the temporary filling was opened, instrumented and irrigated. The MTA (Angelus, Brazil) was mixed with sterile water and placed into the canal using an MTA carrier (Angelus, Brazil) in about 4-5mm thickness (Figure 5). Hand pluggers (Waldent, India) were used to push the MTA to the apex. During radiographical evaluation just after MTA was pushed up to the apex, a considerable unintentional overfilling of the MTA into the periapical tissues was noted. However, no try was made to remove the overfilled MTA. The apexification procedure was completed and the patient was kept for further follow-up. Then a moist paper point was kept inside into the canal for setting of MTA. The next day, remainder of the canal was sealed with back-fill instrument (Calamus, Densply, USA) (Figure 6). The access cavity was filled with Type IX GIC (GC, USA). Three and Six months follow-up (Figure 7 & 8) demonstrated a significant radiographic decrease in the periapical radiolucency. The tooth was free of symptoms and clinically functional.

Fig 1: Preoperative Radiograph.

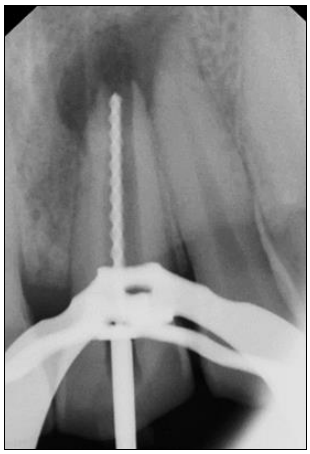

Fig 2: Working length Radiograph.

Fig 3: Radiograph after calcium hydroxide placed into the canal.

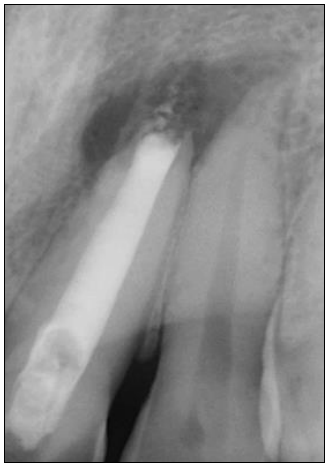

Fig 4: Radiograph after 7 days of dressing change.

Fig 5: Radiograph after MTA placement.

Fig 6: Radiograph after backfill using thermo plasticized gutta percha.

Fig 7: 3 Month's follow-up.

Fig 8: 6 Month's follow-up.

Discussion

Apexification is a procedure that promotes a calcific barrier in a root with an open apex or the continuation of apical development of an incomplete root in teeth with necrotic pulp. This apical end filling material is necessary for placement of root filling materials. Previously calcium hydroxide was the first choice of material for this reason, but this material also has some negatives points such as longer time taken for apical barrier formation (3-24 months) and it was also reported that the root end barrier formed by calcium hydroxide has incomplete appearance of Swiss cheese, which may cause leakage at apex. There is also an increased risk of fracture after prolonged use of calcium hydroxide into the root canal [4-6].

The best calcium hydroxide substitute is MTA. The positives points of these materials are (i) Lesser time for treatment and (ii) no deleterious effect on underlying dentin. One study showed that the apical treatment with MTA shown to have a positive effect on healing and apical closure. The biggest negative point against MTA is that it is difficult to use. Placing this filling material at the apex in a wide canal is a tough task and there is an always a probable risk factor to this material is that accidental overflow into the periapical tissues.

Different bio-membrane can be used for proper positioning of MTA into the root canal during root end filling. The use of these matrices forms the basis of the MTA compaction. Various materials have been proposed as matrices such as calcium sulfate, hydroxyapatite, collagen, platelet-rich fibrin. But these membranes has a very high cost and also placement is very tough technically. Calcium sulfate sets in a much faster rate (2 minutes) & Hydroxyapatite is a very expensive bio-membrane. Another problem of these bio membranes are that once placed, their position cannot be altered as per requirement [5-6]. In this case no apical matrix were used due to their mentioned limitations.

Various authors in their case reports also showed that, intentional extrusion of MTA during apexification procedure neither arises any symptoms to the patient nor the extruded MTA causes any delay in the resolution of periapical radiolucency [7-8].

Studies have shown that the ideal MTA thickness is 5 mm when used as apical barrier material. This thickness was found to be very strong and leak less than 2 mm thickness [9]. another research article shown that 4 mm thick MTA apical barrier provided greater salability than 1 mm thickness [10]. This indicates that the lesser thickness of MTA reduces its stiffness, sealing ability and flexibility when used as a root end plug material. Therefore, according to previous studies, 4-5 mm MTA apical plugs were placed in this case.

This case report showed that there were no such complications occur when MTA is used as root end filling and unintentionally overfilled into the periapical lesion. The tooth remains free of symptoms for the entire period after unintentional overfilled by MTA. Radiographic evaluation also showed the positive effect of periradicular healing, initial bone healing, and progression of extruded material (MTA) into the periradicular region. This rapid formation can be attributed to calcium hydroxide dressing change [11]. Therefore, the absence of clinical and radiological signs clearly indicates a non-surgical approach.

Conclusion

The clinical results in this case showed that MTA is very useful for apexification including periapical healing procedure, even if unintentionally were extruded. Follow-up evaluations at 3-and 6-months support that the overfilled material does not affect periapical tissue repair. These data also highlight the importance of careful application of MTA

apical plugs and do not advocate deliberate placement of MTA in periapical lesions in any situations.

Conflict of Interest
Not available

Financial Support
Not available

References

1. Chapter 10. Vital Pulp Therapy, Pulpotomy, and Apexification. Grossman Endodontic Practice, 13th Ed, Page no. 221-222.
2. Gawthaman M, Vinodh S, Mathian VM, Vijayaraghavan R, Karunakaran R. Apexification with calcium hydroxide and mineral trioxide aggregate: Report of two cases. J Pharm Bioallied Sci. 2013 Jul;5(Suppl 2):S131-S134. Doi: 10.4103/0975-7406.114305. PMID: 23956590; PMCID: PMC3740659.
3. Kumar V, Zameer M, Prasad V, Mahantesh T. Boon of MTA Apexification in Young Permanent Posterior Teeth. Case Rep Dent. 2014;2014:673127. Doi: 10.1155/2014/673127. Epub 2014 Oct 20. PMID: 25431690; PMCID: PMC4241281.
4. Andreasen Jo, *et al*. Long-term calcium hydroxide as a root cannal dressing may increase the risk of root fracture. Dent Traumatol. 2002 Jun;18(3):134-137.
5. Purra AR, Ahangar FA, Chadgal S, Farooq R. Mineral trioxide aggregate apexification: A novel approach. J Conserv Dent. 2016 Jul-Aug;19(4):377-380. Doi: 10.4103/0972-0707.186443. PMID: 27563191; PMCID: PMC4979289.
6. Gangamwar N, *et al*. Apexification with MTA placement – a case report. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861. 2015 Oct;14(10):70-73.
7. Chang SW, Oh TS, Lee W, Cheung GS, Kim HC. Long-term observation of the mineral trioxide aggregate extrusion into the periapical lesion: a case series. Int J Oral Sci. 2013 Mar;5(1):54-57. Doi: 10.1038/ijos.2013.16. Epub 2013 Apr 5. PMID: 23558344; PMCID: PMC3632765.
8. Nagmode PS, Satpute AB, Patel AV, Ladhe PL. The Effect of Mineral Trioxide Aggregate on the Periapical Tissues after Unintentional Extrusion beyond the Apical Foramen. Case Rep Dent. 2016;2016:3590680. Doi: 10.1155/2016/3590680. Epub 2016 Oct 20. PMID: 27840745; PMCID: PMC5093245.
9. Matt GD, Thorpe JR, Strother JM, McClanahan SB. Comparative study of white and gray Mineral Trioxide Aggregate (MTA) simulating a one- or two-step apical barrier technique. Journal of Endodontics. 2004;30(12):876-879.
10. Hachmeister DR, Schindler WG, Walker III WA, Thomas DD. The sealing ability and retention characteristics of mineral trioxide aggregate in a model of apexification. Journal of Endodontics. 2002;28(5):386-390.
11. Abbot P. Apexification with calcium hydroxide-when should the dressing be changed? Case for regular dressings changes. Aust Endod J. 1998;24:27-32.

How to Cite This Article
Datta S, Bhattacharyya A, Maity AB. Unintentional extrusion of mineral trioxide aggregate into the periapical lesion during Apexification: A case report. International Journal of Applied Dental Sciences. 2023;9(3):392-395.