



Apexification Procedure Using Mineral Trioxide Aggregate

Contributed By: Dr. David Thom – July 2000

**History:**

16 year-old male with a fractured incisor following a traumatic incident "many" years ago was treated seven months previously at Toronto's Hospital for Sick Children Dental Clinic, when his tooth was debrided and medicated with calcium hydroxide paste to initiate apexification.

Findings:

Tooth #2.2 is horizontally fractured at mid-third of the crown. The tooth responds normally to percussion, palpation and has normal periodontal probings and mobility. A periapical radiograph shows incomplete root end formation with an apical rarefaction 2-3 mm in diameter.

Treatment Provided:

Using no anaesthetic, the tooth was isolated using a rubber dam and accessed. A dental operating microscope was used to facilitate all endodontic procedures for this tooth. The canal was gently debrided using large hand files and copious amounts of 5.25% sodium hypochlorite irrigant. A Spartan ultrasonic file tip was also used to remove as much debris as possible without destroying apical hard tissue. The Root ZX apex locator produced inconsistent canal length readings so "check" radiographs were used to confirm the actual working length. This measurement was verified by visualising the wet-dry line on a blunt paper point.

Small pieces of CollaCote®, a synthetic collagen material, were gently compacted using hand pluggers to produce a barrier at the level of the apex. Mineral trioxide aggregate (M.T.A.) was introduced into the canal using a Messing gun and compacted against the CollaCote barrier. A radiograph was exposed to confirm adequate placement of M.T.A. to form an apical stop approximately 3-4 mm thick. The blunt end of a large paper point was moistened with water and left in the canal to promote setting. A cotton pellet was placed in the chamber and the tooth restored with a glass ionomer restorative cement.

At the second visit, the patient has remained asymptomatic and the tooth was isolated and accessed as before. A hand plugger was lightly tapped against the M.T.A. plug to confirm a hardened set. The canal was obturated using ZOE sealer and injectable thermoplasticized gutta percha. The tooth was temporarily restored with a cotton pellet and a glass ionomer restorative cement.

Note:

M.T.A. sets in about three hours to form phases of discrete crystals (mainly calcium and silica) and amorphous structures (mainly calcium and phosphate). The seal produced by this material is reported superior to that of other retrofill materials (e.g. amalgam and super EBA). In addition to investigations supporting the biocompatibility of M.T.A., there are indications that it is osteoconductive, promoting the formation of cementum-like hard tissue directly apposed to this material (see Schwartz et al., JADA 130:967-975, 1999; Torabinejad and Chivian, JOE 25(3):197-205, 1999; Torabinejad et al., JOE 21(7):349-353, 1995; Andreasen et al., JOE 19(3):151-153, 1993)



Anterior view showing mid-coronal horizontal fracture of left maxillary lateral incisor.



Occlusal view of #2.2 tooth.



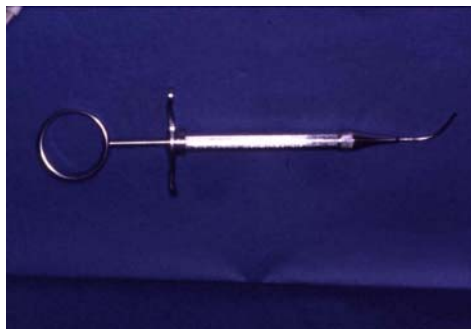
Periapical radiograph showing incomplete root-end development. An apexification procedure using calcium hydroxide paste was initiated seven months previously.



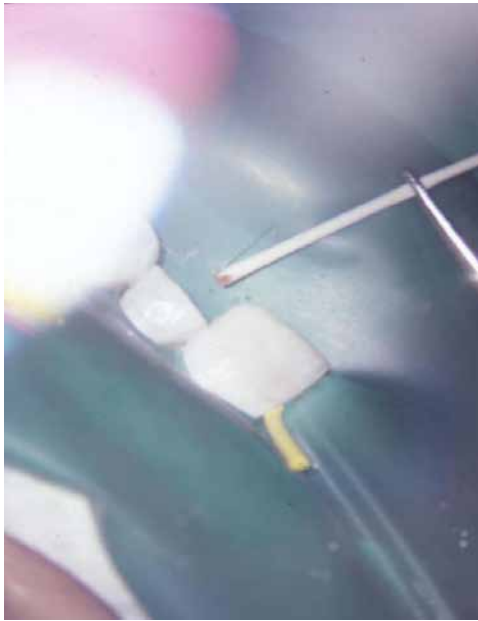
Large files and copious amounts of 2.6% sodium hypochlorite were used to gently debride the canal.



Mineral trioxide aggregate (M.T.A.) after mixing the powder with sterile saline.



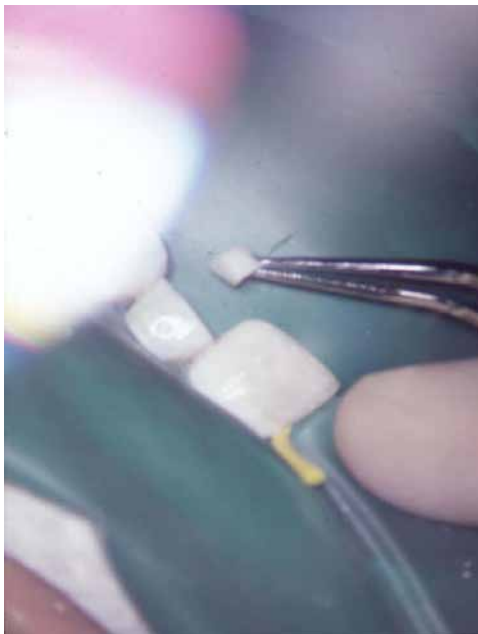
Messing gun used to introduce the M.T.A. into the canal.



The wet-dry line on the blunt end of a large size paper point was used to verify the working length.



CollaCote® absorbable synthetic collagen was used to create a barrier at the apex.



Small piece of CollaCote® was compacted to the level of the apex using a hand plugger.



Radiograph to confirm placement of M.T.A. apical plug using hand pluggers.



Completed obturation using sealer and injectable thermoplasticized gutta percha.



Periapical radiograph exposed one year after treatment. Continuous lamina dura and consistent width of periodontal ligament space suggests healing of lesion has occurred as a result of the M.T.A. apexification procedure.



Another radiographic view suggesting successful healing and regeneration of root-end around the M.T.A. material.