



Mahidol University
Faculty of Dentistry

Regenerative Endodontic Procedures
Mahidol University Guideline
30-4-2019

Case Selection

- Tooth with necrotic pulp and an immature apex.
- Pulp space is not required for post/core as a final restoration.
- Patients not allergic to medicaments and antibiotics necessary to complete procedure

Informed consent

- Two (or more) appointments.
- Use of antimicrobial (s).
- Possible adverse effects; staining of crown/root.

First Appointment

- Local anesthesia (optional).
- Rubber dam isolation and access.
- Copious, gentle irrigation with 20 ml 1.5% NaOCl (20 ml/canal, 5 min).
- Passive ultrasonic irrigation (PUI) for 1 min per canal.
- Irrigated with Saline.
- Dry canals with paper points.
- Place calcium hydroxide or full-strength concentration of triple antibiotic paste (3Mix-MP) (1).
- If the triple antibiotic paste is used:
 - 1) sealing pulp chamber with a dentin bonding agent [to minimize risk of staining] (2)
 - 2) Prepare 1:1:1 ciprofloxacin : metronidazole : minocycline. Take one part of Propylene glycol (P) and the same volume of Macrogol (M). Mix well to make up MP. Mix antibiotics with MP. Stickiness will be like 70% whipped cream.
- Deliver into canal system via syringe below CEJ (minimize crown staining).
- Seal with 3-4 mm of a temporary restorative material such as Cavit™, IRM™, glass ionomer or another temporary material. Dismiss patient for 3-4 weeks (3)

Second Appointment (3-4 weeks after 1st visit)

- Assess response to initial treatment. If there are signs/symptoms of persistent infection, consider additional treatment time with medication.

- If no symptoms, anesthesia without vasoconstrictor.
- Rubber dam isolation
- Copious, gentle irrigation with 20 ml of 17% EDTA 5 min and irrigated with saline 20 ml (4).
- Dry canal with paper points.
- Sealing pulp chamber with a dentin bonding agent (If need) (5).
- Create bleeding into canal system by over-instrumenting (endo file, endo spreader), induce by rotating a pre-curved at 2 mm past the apical foramen with the goal of having the entire canal filled with blood to the level of the CEJ.
- Stop bleeding at a level that allows for 3-4 mm of restorative material. Place a resorbable matrix such as CollaPlug™, Collacote™, CollaTape™ over the blood clot if necessary.
- Place at least 3 mm of non-discoloration Bioceramic material such as Biodentine as capping material in teeth where there is an esthetic concern (6-7).
- A final restoration should be placed to complete the treatment.

Follow-up

- 1, 3, 6, 12 months (yearly for 5 years)
- Clinical and radiographic examination.
- Pulp vitality test response.

References:

1. Hoshino E, Kurihara-Ando N, Sato I, Uematsu H, Sato M, Kota K, et al. In-vitro antibacterial susceptibility of bacteria taken from infected root dentine to a mixture of ciprofloxacin, metronidazole and minocycline. *Int Endod J* 1996;29(2):125-30.
2. Kim JH, Kim Y, Shin SJ, Park JW, Jung IY. Tooth discoloration of immature permanent incisor associated with triple antibiotic therapy: a case report. *J Endod* 2010;36(6):1086-91.
3. Banchs F, Trope M. Revascularization of immature permanent teeth with apical periodontitis: new treatment protocol? *J Endod* 2004;30(4):196-200.
4. Taweewattanapaisan P, Jantararat J, Ounjai P, Janebodin K. The Effects of EDTA on Blood Clot in Regenerative Endodontic Procedures. *J Endod* 2019;45(3):281-6.
5. Shokouhinejad N, Nekoofar MH, Pirmoazen S, Shamshiri AR, Dummer PM. Evaluation and Comparison of Occurrence of Tooth Discoloration after the Application of Various Calcium Silicatebased Cements: An Ex Vivo Study. *J Endod* 2016;42(1):140-4.
6. Wongwatanasanti N, Jantararat J, Sritanaudomchai H, Hargreaves KM. Effect of Bioceramic Materials on Proliferation and Odontoblast Differentiation of Human Stem Cells from the Apical Papilla. *J Endod* 2018;44(8):1270-5.
7. Bacterial leakage and marginal adaptation of various bioceramics as apical plug in open apex model. Lertmalapong P, Jantararat J, Srisatjaluk RL, Komoltri C. *J Investig Clin Dent*. 2019 Feb;10(1):e12371.