

## Considerations for a Regenerative Endodontics Procedure

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These considerations should be seen as one possible source of information and, given the rapid evolving nature of this field, clinicians should also actively review new findings elsewhere as they become available.

### Case Selection:

- Tooth with necrotic pulp and an immature apex
- Pulp space not needed for post/core, final restoration
- No known allergies to antibiotics if intended for use
- Compliant patient (parent/guardian)

### Informed Consent

- Two (or more) appointments
- Use of antimicrobial(s)
- Possible adverse effects: staining of crown/root, lack of response to treatment, pain/infection
- Alternatives: MTA apexification, no treatment, extraction (when deemed non-salvageable)
- Permission to enter information into AAE database (optional)

### First Appointment

- Local anesthesia, rubber dam isolation, access
- Copious, gentle irrigation with 20ml 1.5% NaOCl using an irrigation system that minimizes the possibility of extrusion of irrigants into the periapical space (e.g., needle with closed end and side-vents, or EndoVac). The lower concentrations of NaOCl are advised, to minimize cytotoxicity to stem cells in the apical tissues.
- Dry canals
- Place antibiotic paste or calcium hydroxide.  $\text{Ca(OH)}_2$  is antimicrobial at concentrations that do not induce stem cell toxicity and is widely available. As an alternative, if the triple antibiotic paste is used: 1) consider sealing pulp chamber with a dentin bonding agent [to minimize risk of staining] and 2) mix 1:1:1 ciprofloxacin:metronidazole:minocycline in a lower concentration (0.01-0.1 mg/ml) to avoid stem cell toxicity; these lower concentrations appear as a liquid form and are no longer a paste.
- Deliver into canal system via Lentulo spiral, MAP system or syringe
- If triple antibiotic is used, ensure that it remains below CEJ (minimize crown staining). As an alternative,  $\text{Ca(OH)}_2$  does not cause staining.
- Seal with 3-4mm Cavit, followed by IRM, glass ionomer cement or another temporary material
- Dismiss patient for 3-4 weeks

### Second Appointment

- Assess response to initial treatment. If there are signs/symptoms of persistent infection, consider additional treatment with the antimicrobial, or an alternative

antimicrobial. Recall the patient in about 3-4 weeks as before.

- Anesthesia with 3% mepivacaine without vasoconstrictor, rubber dam, isolation
- Copious, slow irrigation with 20ml 17% EDTA, followed by normal saline, using a similar closed end needle.
- Dry with paper points
- Create bleeding into canal system by over-instrumenting (endo file, endo explorer)
- Stop bleeding 3mm from CEJ
- Place CollaPlug/Collacote at 3mm below CEJ.
- Place 3-4mm of a MTA and reinforced glass ionomer and place permanent restoration. Glass ionomer may be an alternative to MTA in cases where discoloration of the crown is a potential concern.

#### Follow-up

- Clinical and Radiographic exam:
  - No pain or soft tissue swelling (often observed between first and second appointments)
  - Resolution of apical radiolucency (often observed 6-12 months after treatment)
  - Increased width of root walls (this is generally observed before apparent increase in root length and often occurs 12-24 months after treatment)
  - Increased root length
  - apical closure?

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